



Missouri  
Department of  
Natural Resources

# **THE 2008 MISSOURI WASTE COMPOSITION STUDY**

**March, 2009**

Conducted by:

**Midwest Assistance Program, Inc.**  
**The Midwestern Rural Community Assistance Partner**



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# Table of Contents

<b>Executive Summary</b>	<b>5</b>
<b>Section I</b>	
Introduction	10
Purpose of the Study	10
History of Waste Composition Studies in Missouri	10
Other Waste Composition or Characterization Studies	11
Methodology Used in the 2008 Missouri Waste Composition Study	11
Definition of Missouri Waste Sectors	15
<b>Section II</b>	
Sectors of the Missouri Waste Stream	17
Construction Waste	17
Demolition Waste	21
Industrial Waste	26
Other Waste	31
Special Waste	34
Municipal Solid Waste	38
<b>Section III</b>	
Changes in the waste stream over time	41
Differences in the waste stream based on demographics	43
Large Metro areas	43
Small metro areas	44
Rural Areas	45
Variables in the Missouri Waste Composition	48
<b>Section IV</b>	
Reports on the Landfills and Transfer Stations Observed for the Study	50
Black Oak Landfill	51
City of Columbia Landfill	55
City of Springfield Landfill	59
City of St. Joseph Landfill	64
Courtney Ridge Landfill	68
Fred Weber Landfill	72
IESI Timber Ridge Landfill	76
Jefferson City Landfill	80
Lemons Landfill	84
Maple Hill Landfill	88
Neosho Transfer Station	92
Pink Hill Acres Demolition Landfill	96
Prairie View Landfill	100
Show-Me Landfill	104
St. Louis North Metro Transfer Station	108

## List of Tables

### Section I

Table I-1: Observation Locations and Dates

Table I-2: Sampling data

### Section II

Table II-1: Construction Waste Observed by Facility

Table II-2: Estimated Construction Waste - 2007

Table II-3: Demolition Waste Observed by Facility

Table II-4: Estimated Demolition Waste - 2007

Table II-5: Industrial Waste Observed by Facility

Table II-6: Estimated Industrial Waste - 2007

Table II-7: 'Other' Waste Observed by Facility

Table II-8: Estimated Other Waste - 2007

Table II-9: Special Waste Observed by Facility

Table II-10: Estimated Special Waste – 2007

Table II-11: MSW Composition by Weight

Table II-12: Estimated Municipal Solid Waste - 2007

### Section III

Table III-1: Changes in the MSW Sector

Table III-2: Changes in the Construction Waste Sector

Table III-3: Changes in Demolition Waste Sector

Table III-4: Changes in Industrial Waste Sector

Table III-5: Changes in 'Other' and Special Waste

Table III-6: Kansas City Area Waste Sector Percentages

Table III-7: Kansas City Area Waste Sector Tonnage

Table III-8: St. Louis Area Waste Sector Percentages

Table III-9: St. Louis Area Waste Sectors

Table III-10: Small Metro Waste Sector Percentages

Table III-11: Small Metro Area Waste Sectors

Table III-12: Rural Waste Sector Percentages

Table III-13: Rural Area Waste Sectors

Table III-14: Waste Sector Percentages by Demographic Area

### Section IV

Table IV-1: Observed Waste Sectors at the Black Oak Landfill

Table IV-2: Observed Waste Sectors at the City of Columbia Landfill

Table IV-3: Observed Waste Sectors at the City of Springfield Landfill

Table IV-4: Observed Waste Sectors at the City of St. Joseph Landfill

Table IV-5: Observed Waste Sectors at the Courtney Ridge Landfill

Table IV-6: Observed Waste Sectors at the Fred Weber Landfill

Table IV-7: Observed Waste Sectors at the Timber Ridge Landfill

Table IV-8: Observed Waste Sectors at the Jefferson City Landfill

Table IV-9: Observed Waste Sectors at the Lemons Landfill

Table IV-10: Observed Waste Sectors at the Maple Hill Landfill

Table IV-11: Observed Waste Sectors at the Neosho Transfer Station

Table IV-12: Observed Waste Sectors at the Pink Hill Acres Demolition Landfill

Table IV-13: Observed Waste Sectors at the Prairie View Landfill

Table IV-14: Observed Waste Sectors at the Show-Me Landfill

Table IV-15: Observed Waste Sectors at the St. Louis Metro North Transfer Station.

## List of Charts

### Section II

*Chart II-1: Percent Composition of Construction Waste Observed by Facility*

*Chart II-2: Construction Waste Changes from 1999-2008*

*Chart II-3: Composition of Demolition Waste by Facility*

*Chart II-4: Demolition Waste Changes from 1999-2008*

*Chart II-5: Composition of Industrial Waste by Facility*

*Chart II-6: Industrial Waste Changes from 1999-2008*

*Chart II-7: Composition of 'Other' Waste by Facility*

*Chart II-8: 'Other' Material Waste Changes from 1999-2008*

*Chart II-9: Composition of Special Waste by Facility*

*Chart II-10: Special Waste Sector Changes from 1999-2008*

*Chart II-11: Special Waste Sector Changes from 1999-2008*

### Section III

*Chart III-1: Statewide Changes in All Waste Sectors*

*Chart III-2: Waste Sector Percentages by Demographic Area*

*Chart III-3: Waste Sector Changes in the Large Metro Area*

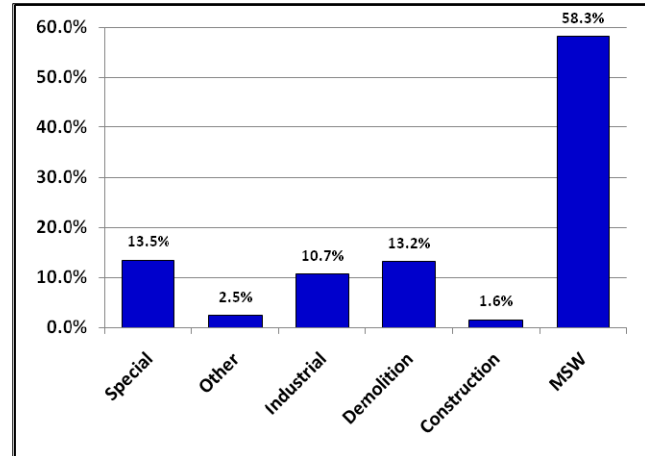
*Chart III-4: Waste Sector Changes in the Small Metro Area*

*Chart III-5: Waste Sector Changes in the Rural Areas*

# Executive Summary

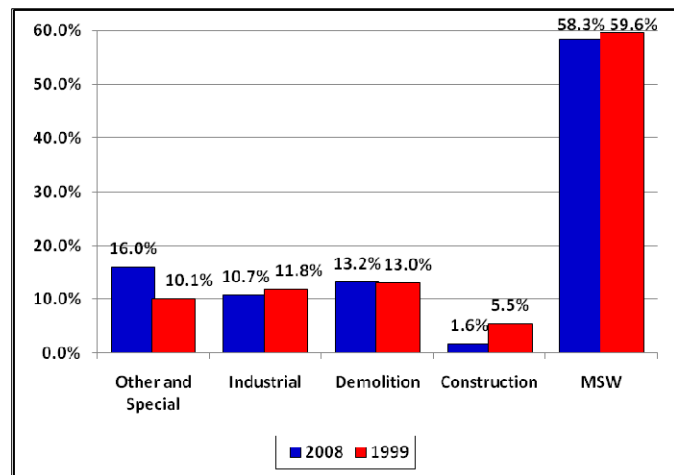
The 2008 Missouri Waste Composition Study was funded by the Missouri Department of Natural Resources Solid Waste Management Program and conducted by the Midwest Assistance Program (MAP). The study observed 67,359 tons of waste received at 15 Missouri landfills and transfer stations during the summer and fall of 2008. Each delivery was classified into one of five waste sectors. Each of the major waste sectors was broken into waste components. The table below depicts the composition percentage of all waste sectors, by weight.

<b>Major Waste Sectors</b>	<b>% of Waste</b>
Special Waste	13.5%
Other Waste	2.5%
Industrial Waste	10.7%
Demolition Waste	13.2%
Construction Waste	1.6%
Municipal Solid Waste (MSW)	58.3%



The previous waste composition study was conducted in 1999 by MAP using the same methodology as 2008. The waste composition has changed slightly over the past nine years. The following table and chart depict the change in the major waste sectors from 1999 to 2008. In 1999 the other waste and special waste sectors were combined.

<b>Sector</b>	<b>1999</b>	<b>2008</b>
Special	N/A	13.5%
Other	10.1%	2.5%
Industrial	11.8%	10.7%
Demolition	13.0%	13.2%
Construction	5.5%	1.6%
MSW	59.6%	58.3%

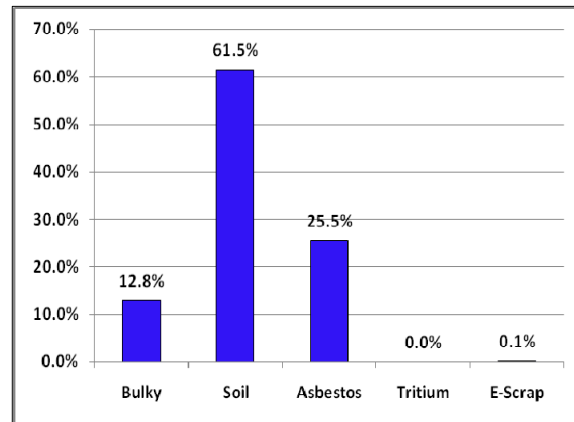


## Waste Sectors

**The Special waste sector** accounted for 13.5% of the entire waste stream. The components within this sector included the following materials:

**Special Waste Component % of Sector**

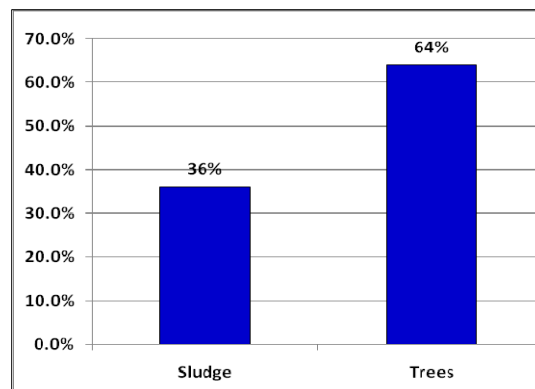
Bulky Items	12.8%
Contaminated Soil	61.5%
Asbestos	25.5%
Tritium	0%
E scrap	0.1%



The 'Other' waste sector accounted for 2.5% of the entire waste stream. The components within this sector included the following materials:

**Other Waste Component % of Sector**

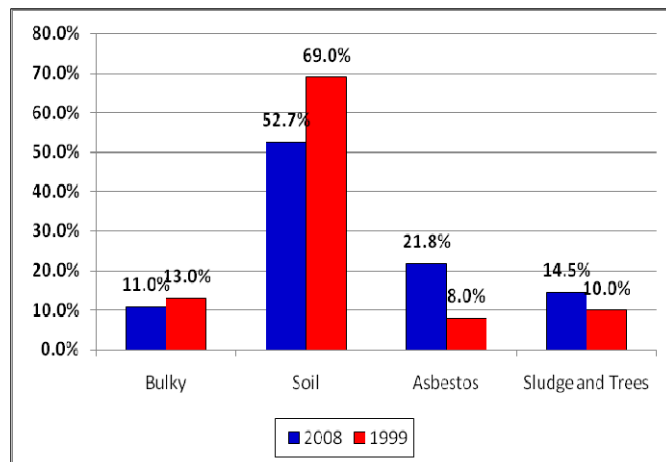
Sludge	36%
Tree Trunks and limbs	64%



The other waste and special waste sectors were combined in the 1999 study. If the Special and Other waste sectors are combined in the 2008 study they account for 16% of the entire waste stream. Changes in these waste sectors between 1999 and 2008 are depicted below:

**Special and Other 1999 2008**

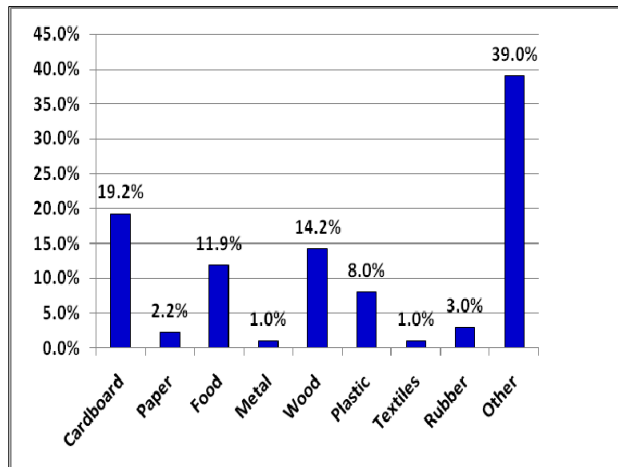
Bulky Items	13%	11%
Contaminated Soil	69%	52.7%
Asbestos	8%	21.8%
Sludge and Trees	10%	14.5%



The Industrial waste sector accounted for 10.7% of the entire waste stream. The other waste component was primarily auto fluff and foundry sand. The components within this sector included the following materials:

**Industrial Component    % of Sector**

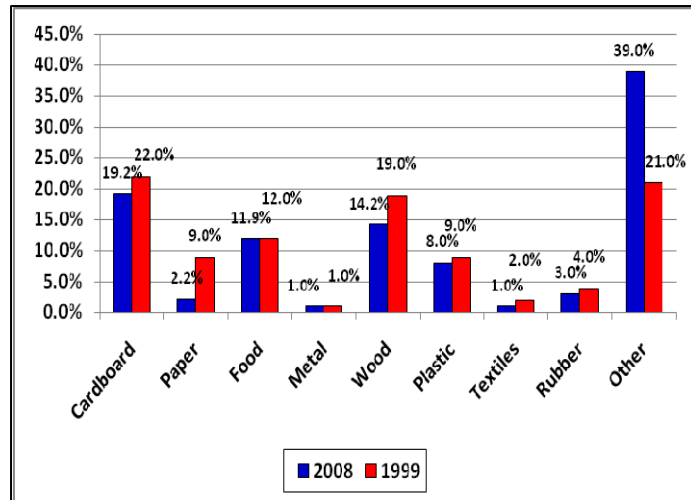
Cardboard	19.2%
Paper	2.2%
Food	11.9%
Metal	1%
Wood	14.2%
Plastic	8%
Textiles	1%
Rubber	3%
Other	39%



Changes in the industrial waste components between 1999 and 2008 are depicted below:

**Industrial Waste    1999    2008**

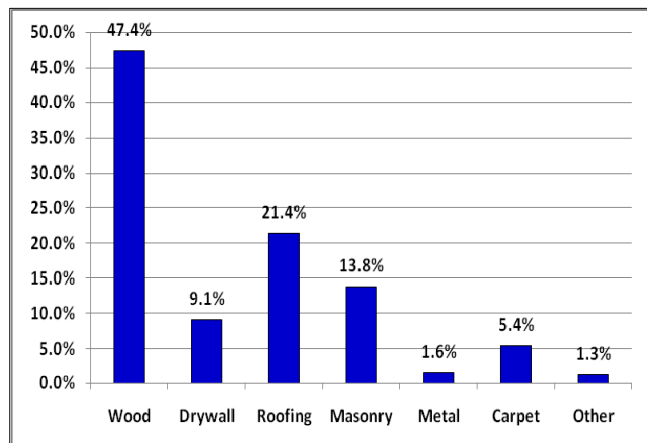
Cardboard	22%	19.2%
Paper	9%	2.2%
Food	12%	11.9%
Metal	1%	1%
Wood	19%	14.2%
Plastic	9%	8%
Textiles	2%	1%
Rubber	4%	3%
Other	21%	39%



**The Demolition waste sector** accounted for 13.2% of the entire waste stream. The components within this sector included the following materials:

**Demolition Component    % of Sector**

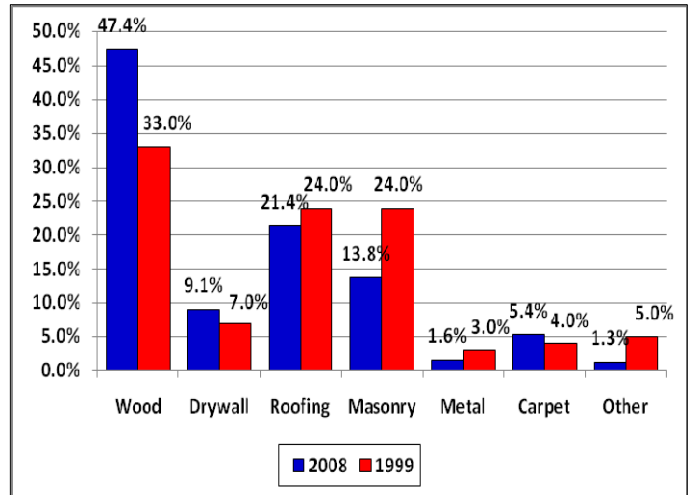
Wood	47.4%
Drywall	9.1%
Roofing	21.4%
Masonry	13.8%
Metal	1.6%
Carpet	5.4%
Other	1.3%



Changes in the Demolition waste components between 1999 and 2008 are depicted below:

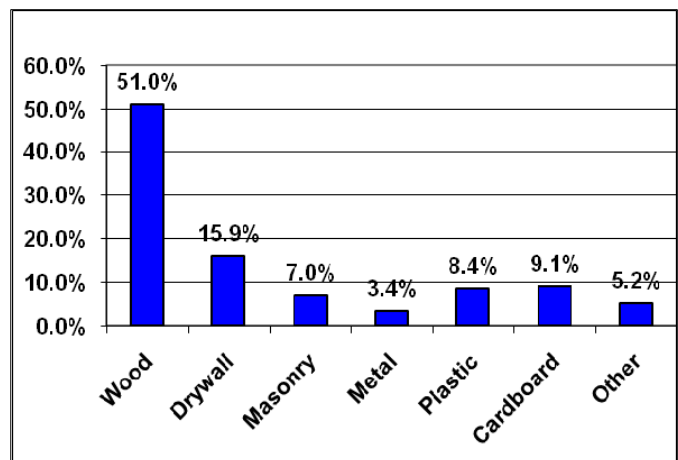


<b>Demolition Waste</b>	<b>1999</b>	<b>2008</b>
Wood	33%	47.4%
Drywall	7%	9.1%
Roofing	24%	21.4%
Masonry	24%	13.8%
Metal	3%	1.6%
Carpet	4%	5.4%
Other	5%	1.3%



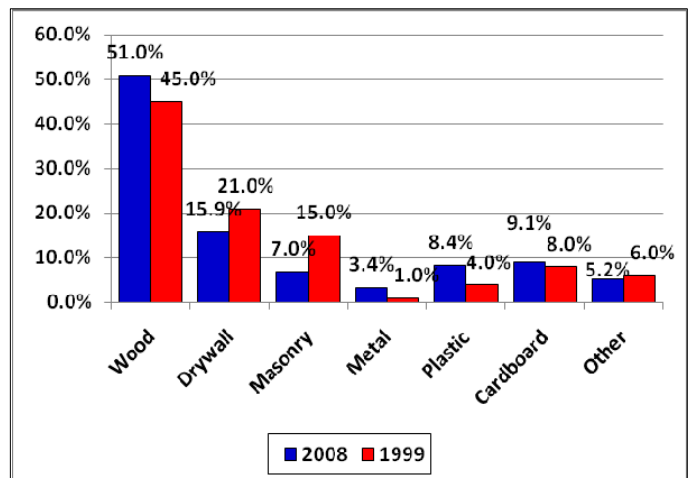
**The Construction waste sector** accounted for only 1.6% of the entire waste stream. The components within this sector included the following materials:

<b>Construction Component</b>	<b>% of Sector</b>
Wood	51%
Drywall	15.9%
Masonry	7%
Metal	3.4%
Plastic	8.4%
Cardboard	9.1%
Other	5.2%



Changes in the Construction waste components between 1999 and 2008 are depicted below:

<b>Const. Waste</b>	<b>1999</b>	<b>2008</b>
Wood	45%	51%
Drywall	21%	15.9%
Masonry	15%	7%
Metal	1%	3.4%
Plastic	4%	8.4%
Cardboard	8%	9.1%
Other	6%	5.2%



The following table lists the estimated waste sectors and components for 1999 and 2008. The MSW portion was determined through the study conducted in 2006-2007 which can be viewed in its entirety at <http://www.dnr.mo.gov/env/swmp>. The percentages for all major waste sectors and components observed during this study and previous studies were applied to the tonnage received in 1999 (4,488,623 tons) and 2007 (6,364,557 tons).

<b>Waste Sector &amp; Components</b>	<b>Observed Tonnage 2008</b>	<b>Estimated % of all Waste 2008</b>	<b>Estimated 2007 Tonnage</b>	<b>Estimated % of all Waste 1999</b>	<b>Estimated 1998 Tonnage</b>
<b>MSW</b>	<b>39806</b>	<b>58.3%</b>	<b>3710537</b>	<b>59.6%</b>	<b>2675219</b>
MSW Paper	13208	19.61%	1247854	22.1%	991986
MSW Glass	2136	3.17%	201853	3.4%	152613
MSW Metal	2372	3.52%	224116	4.1%	184034
MSW Plastics	6775	10.06%	640068	8.6%	386022
MSW Organics	12406	18.42%	1172159	18.5%	830395
MSW Inorganics	1626	2.41%	153616	2.8%	125681
MSW Special Waste	750	1.11%	70871	N/A	0
<b>Construction</b>	<b>1014</b>	<b>1.6%</b>	<b>101833</b>	<b>5.5%</b>	<b>246874</b>
Wood	518	0.77%	48903	2.5%	112216
Drywall	161	0.24%	15249	1.3%	58352
Masonry	71	0.11%	6689	0.8%	35909
Metal	34	0.05%	3212	0.1%	4489
Plastic	85	0.13%	8050	0.2%	8977
Cardboard	93	0.14%	8739	0.5%	22443
Other	53	0.08%	4998	0.3%	13466
<b>Demolition</b>	<b>8565</b>	<b>13.2%</b>	<b>840122</b>	<b>13.0%</b>	<b>583521</b>
Wood	4058	6.02%	383419	4.3%	193011
Drywall	781	1.16%	73808	0.9%	40398
Roofing	1832	2.72%	173040	3.1%	139147
Masonry	1180	1.75%	111439	3.2%	143636
Metal	133	0.20%	12594	0.4%	17954
Carpet	466	0.69%	43999	0.5%	22443
Other	116	0.17%	10912	0.6%	26932
<b>Industrial</b>	<b>7433</b>	<b>10.7%</b>	<b>681008</b>	<b>11.8%</b>	<b>529658</b>
Cardboard	1424	2.11%	134577	2.6%	116704
Paper	167	0.25%	15788	1.0%	44886
Food	888	1.32%	83851	1.5%	67329
Metal	71	0.11%	6727	0.2%	8977
Wood	1063	1.58%	100432	2.2%	98750
Plastic	609	0.90%	57491	1.1%	49375
Textiles	69	0.10%	6557	0.3%	13466
Rubber	220	0.33%	20786	0.5%	22443
Other	2922	4.34%	276071	2.4%	107727
<b>Other</b>	<b>1531</b>	<b>2.5%</b>	<b>159114</b>	<b>1.0%</b>	<b>44886</b>
Sludge	548	0.81%	51813	0.4%	17954
Tree Trunks	983	1.46%	92827	0.6%	26932
<b>Special</b>	<b>9015</b>	<b>13.5%</b>	<b>859215</b>	<b>9.1%</b>	<b>408465</b>
Bulky	1155	1.71%	109106	1.40%	62841
Contaminated Soil	5548	8.24%	524204	6.70%	300738
Asbestos	2301	3.42%	217418	1.00%	44886
Tritium	0	0.00%	0	0.00%	0
E-scrap	11	0.02%	1039	0.00%	0
<b>TOTALS</b>	<b>67364</b>	<b>100%</b>	<b>6364557</b>	<b>100%</b>	<b>4488623</b>

# Section I

## **INTRODUCTION**

In 2008 the Missouri Department of Natural Resources Solid Waste Management Program issued a Request for Proposals (RFP) to identify components and percentages of waste in the entire solid waste stream entering Missouri landfills. The Midwest Assistance Program (MAP) was awarded the contract for the study.

The Information contained within this report characterizes the composition of solid waste received by Missouri transfer stations and landfills during the study (June 2008 - October 2008). For the MSW sector components, this study incorporates the results determined in the MSW characterization study conducted by MAP in 2006-07. A complete description of the MSW sector can be found in the 2006-2007 Municipal Solid Waste Composition Study, available through The Missouri Department of Natural Resources Solid Waste Management Program web site ([www.dnr.mo.gov/env/swmp](http://www.dnr.mo.gov/env/swmp)).

The 2008 study observed solid waste received at 15 landfills and transfer stations between June and October, 2008. Each facility was observed for one week. Each solid waste load was observed, classified into one of six major waste sector categories (MSW, Construction waste, Demolition waste, Industrial waste, Other waste, and Special waste), and the percentage of each material within that sector was visually estimated and recorded. The percentages were applied to the actual weights received from the scale data to determine the tonnage for each material. The findings from this study are included in this report.

## **PURPOSE OF THE STUDY**

The Missouri Waste Composition Study is useful and necessary for the following reasons:

- The study provides a picture of the changes in the Missouri waste stream over the past decade.
- The study provides an estimate of the weight of materials that are discarded in Missouri landfills and the opportunities for reduction, reuse, and recycling. This information will assist state and district planners to more efficiently target grant programs.
- The study provides information on material sectors that are currently being disposed so that grant applicants can estimate available waste materials.
- The study provides information for municipal and private recycling programs. Municipal and private recyclers can use the data to predict material flows, collection vehicles needed, plan for processing and end market capacities, project revenues and operating expenses, and target educational materials.

## **HISTORY OF WASTE COMPOSITION STUDIES IN MISSOURI**

The first statewide waste composition study done in Missouri was The Missouri Statewide Resource Recovery Feasibility and Planning Study. This study was initiated by the Missouri Environmental Improvement and Energy Resource Authority (EIERA) in 1987. Four municipal landfills (Springfield, Lee's Summit, Columbia, and Willow Springs) were sampled. This study was limited to MSW. The results of this study led to the passage of Senate Bill 530 and the creation of the twenty solid waste management districts throughout the state.

In 1996-1999, the Missouri Department of Natural Resource's Solid Waste Management Program funded the first statewide waste composition study to characterize and analyze the entire solid waste stream at Missouri landfills and transfer stations. The Study was conducted by the Midwest Assistance Program (MAP). MSW was studied from 1996-97. The entire waste stream was studied in 1998-99. The same methodology was used in both the 1996-99 study and the 2006-2007 MSW study and the current study. Therefore, conclusions about the changes in waste composition between these dates can be drawn without questioning the change in methods used to sample and process the data. Comparisons between the 1996-99 study and the 2008 study are discussed in Section III.

### **OTHER WASTE COMPOSITION OR CHARACTERIZATION STUDIES**

This study differs from various other waste characterization studies because it examines the entire waste stream entering Missouri sanitary landfills. Almost every state has conducted site specific waste composition or characterizations studies of one type or another to determine what is "in" their solid waste. A variety of methods have been used in these studies. Almost all of these studies concerned MSW but did not examine the remaining waste stream. Variables include sample locations, sample size, sort categories, and statistical manipulations. Comparing the results is often misleading because of the great differences in the methods used.

The state of California has conducted several waste characterization studies. Their web site describes their approach to characterizing solid waste at <http://www.ciwmb.ca.gov/WasteChar/>.

The U.S. Environmental Protection Agency (EPA) has used what is often referred to as the Franklin Method. Details on this waste characterization study can be found on the EPA website: <http://www.epa.gov/epawaste/nonhaz/municipal/msw99.htm>.

This method uses a *materials flow methodology*, which relies heavily on a mass balance approach. Using data gathered from industry associations, key businesses, and similar industry sources, and supported by government data from sources such as the Department of Commerce and the U.S. Census Bureau, this method estimates tons of materials and products generated, recycled, or discarded. Other sources of data, such as waste characterizations and surveys performed by governments, industry, or the press, supplement this data.

Other waste Characterizations that may be used to understand methodology are:

- Wisconsin Statewide Waste Characterization Study – May 2003 by Cascadia Consulting
- Iowa Statewide Waste Characterization Study – February 2006 by RW Beck
- Construction, Renovation and Demolition Waste Characterization Study – December 2000 by CG&s.

### **METHODOLOGY USED TO DETERMINE THE NON MSW COMPONENTS**

Previous studies determined the composition of the MSW. However, it was necessary to determine what percentage MSW is in the total waste stream. MSW is only one sector of the total waste disposed in Missouri. All the waste sectors must be examined and quantified before the percentage and quantity of MSW can be accurately estimated. The 2006-2007 study characterized the components of the MSW sector. That study determined

what percentage of each material was in the Missouri MSW sector. For instance, about 33.63% of the MSW was paper waste. But what did that percentage mean? How many tons of MSW paper is disposed annually? What percentage of the entire waste stream did MSW paper comprise?

Each landfill and transfer station that sends their waste out of state reports their total waste received to DNR each quarter. After estimating import and export waste, DNR publishes a report on the total waste disposed in Missouri. The last complete tonnage report at the time of this writing was for the year ending 12/31/07.

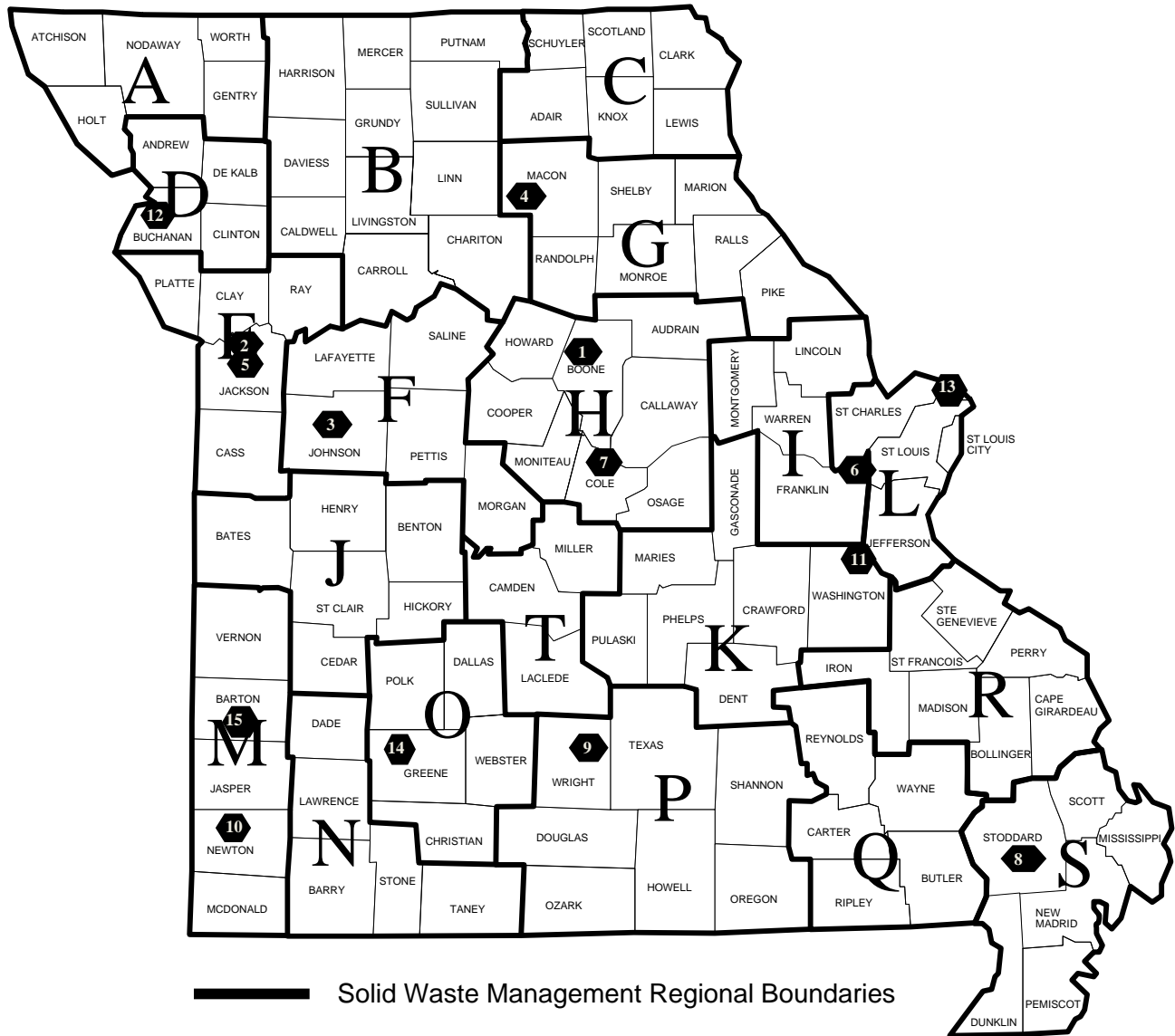
In 2007 DNR estimated that 6,364,557 tons of waste was disposed in Missouri landfills or sent to out of state landfills. However, it cannot be assumed that 33.63% of the entire waste stream is paper because the total waste stream is not exclusively MSW. There are other sectors in the waste stream (construction waste, demolition waste, industrial waste, etc.). The only way to know the true percentage of MSW paper in the total waste stream is to understand what the other waste sectors are, and what percent of the waste stream they comprise.

The 2008 Missouri Waste Composition Study determined that the best way to estimate waste sectors delivered to Missouri landfills and the materials within these sectors was to observe and record waste unloaded at Missouri landfills and transfer stations. The Missouri Department of Natural Resources Solid Waste Management Program selected the landfills and transfer stations to be observed during 2008. A total of 15 facilities were observed for a period of one week each. The week that was chosen for observation was deemed a 'typical' week and the waste composition were not significantly different than any other typical week (holiday weeks were avoided).

The map below identifies the landfills and transfer stations observed during the study.

# 2008 Missouri Waste Composition Study

## Sites Sampled by County and Solid Waste Management Regions



(LF=Landfill TS=Transfer Station)

- |                             |                      |                          |
|-----------------------------|----------------------|--------------------------|
| 1. Columbia LF              | 6. Fred Weber LF     | 11. Timber Ridge LF      |
| 2. Courtney Ridge LF        | 7. Jefferson City LF | 12. St. Joseph LF        |
| 3. Show Me (Warrensburg) LF | 8. Lemons LF         | 13. St. Louis (north) TS |
| 4. Maple Hill (Macon) LF    | 9. Black Oak LF      | 14. Springfield LF       |
| 5. Pink Hill Acres Demo LF  | 10. Neosho TS        | 15. Prairie View LF      |

The following table identifies the landfills and transfer stations where waste loads were observed and data collected during the 2008 study.

***Table I-1: Observation Locations and Dates***

<b>Observation Date</b>	<b>Landfills and TS</b>	<b>2007 Tonnage</b>	<b>Included in 1999 Study</b>	<b>Owner</b>
June 2-6	Columbia	175175	Yes	Municipal
June 9-13	Show Me	173894	No	Allied
June 16-20	Timber Ridge	172796	No	IESI
June 23-27	Maple Hill	168386	Yes	Veolia
July 7-11	Springfield	103140	No	Municipal
July 14-18	Black Oak	362734	Yes	Waste Corp
August 4-8	St. Louis TS	202891	No	Waste Mangmt
August 11-15	Lemons	108696	Yes	Allied
August 18-22	Courtney Ridge	520394	Yes	Allied
August 25-29	St. Joseph	136964	Yes	Municipal
September 8-12	Fred Weber	995443	Yes	Weber
September 15-19	Prairie View	581253	Yes	Allied
September 22-26	Jefferson City	200218	No	Allied
Sept 29 - Oct 3	Neosho TS	18683	No	Municipal
October 6-10	Pink Hill Acres	34659	No	Bowen
<b>2007 Tonnage</b>		<b>3955326</b>		

The method of observation was the same for each landfill. Data was collected by Environmental Data Services at each landfill for a one week period in the same way it was collected in 1999. Holiday weeks and special events that might skew the data were avoided. The date, time, truck number, and the owner of each vehicle bringing waste to the landfill was recorded when it arrived at the unloading area. When that vehicle unloaded, the composition of the waste was visually inspected and the percentage, by weight, of each component was estimated and entered as a percentage of the load. When traffic permitted, the observer walked around each load to visually characterize the materials within that load. If it was not possible to walk around the load, the observation was done as close as physically possible with the use of binoculars.

At the end of each day the weight of each load was obtained from the scale data and the percentage for each material that was observed within each load was calculated. The load weights and material percentages were entered into a Microsoft Excel spreadsheet for analysis.

The following table depicts the start and end date for each observation. It also summarizes the waste loads, hours, and tons observed at each facility.

**Table I-2: Sampling Data**

<b>Waste Facility</b>	<b>Start Date</b>	<b>End Date</b>	<b>Loads Observed</b>	<b>Hours Observed</b>	<b>Tons Observed</b>
Black Oak	14-Jul	18-Jul	369	50	7052
Columbia	2-Jun	6-Jun	717	50	3278
Courtney Ridge	18-Aug	22-Aug	1152	47	10627
Fred Weber	8-Sep	12-Sep	1305	40	12017
IESI Timber Ridge	16-Jun	20-Jun	341	52	3757
Jefferson City	22-Sep	26-Sep	460	48	3460
Lemons	11-Aug	15-Aug	223	45	2263
Maple Hill	23-Jun	26-Jun	343	40	3891
Neosho T.S.	29-Sep	3-Oct	95	45	403
Pink Hill Acres Demo	6-Oct	10-Oct	129	50	706
Prairie View	15-Sep	19-Sep	345	45	7887
Show - Me	9-Jun	13-Jun	345	47	4053
Springfield	7-Jul	11-Jul	521	36	1802
St. Joseph	25-Aug	29-Aug	646	46	3002
St. Louis T.S.	4-Aug	8-Aug	780	50	3164
<b>Totals</b>			<b>7771</b>	<b>691</b>	<b>67364</b>

### **DEFINITION OF MISSOURI WASTE SECTORS**

The Missouri solid waste stream is made up of the following solid waste sectors:

**Construction and Demolition waste** loads were assessed separately instead of combining them into a collective C&D category. The reasoning was that construction waste is cleaner and more easily separated than demolition waste. Therefore if a material recycling program was instituted, it would be easier to source separate and reclaim construction waste rather than demolition waste. Waste was classified as demolition if the materials were attached to each other, pulverized, or unable to be easily separated. The construction and demolition waste sectors are characterized and discussed in Section II.

**Industrial waste** loads are byproducts of industrial or manufacturing processes. Industrial waste is normally homogeneous, containing a single waste product and/or its packaging. This waste was normally delivered to the waste facility in open top roll-off containers or compactor units. The industrial waste sector is characterized and discussed in Section II.

**Other waste** was defined by the solid waste management program as materials not included in the other sectors, such as, municipal sewage sludge, unidentifiable sludge, tree limbs and stumps. This waste sector is characterized and discussed in Section II.

**Special Waste** was defined as bulky items (including furniture, mattresses, box springs, bicycles, and large appliances), soil and inert materials, asbestos, tritium exit signs, and e-scrap (such as televisions, monitors, computers, computer peripherals and cellular phones). This waste sector is characterized and discussed in Section II.

**Municipal Solid Waste (MSW)** is defined as waste generated by residential, institutional, and commercial sources. MSW is normally disposed in dumpsters, small containers, or



plastic bags. MSW is normally delivered to the landfill or transfer station in front, side, or rear load packer trucks. The components of the MSW sector were determined in the 2006-2007 study.

## SECTION II – Sectors of the Missouri Waste Stream

### THE CONSTRUCTION WASTE SECTOR

Construction and Demolition waste loads were assessed separately instead of combining them into a collective C&D category. The reasoning was that construction waste is cleaner and more easily separated than demolition waste. Therefore if a material recycling program was instituted it would be easier to source separate and reclaim construction waste. Waste was classified as demolition if the materials were attached to each other, pulverized, or unable to be easily separated. Construction waste is normally delivered to a waste facility in a roll-off container brought directly from the construction site.



Construction loads normally contained several construction materials such as the one pictured on the left. Each of these loads was visually inspected and the weight of each material was estimated and expressed as a percentage of the entire load. That percentage was then applied to the scale weights to determine the weight of the material.

**The Construction waste sector consisted of seven components:**

**Wood:** Construction waste wood is predominantly new wood and not attached to other materials. Wood waste includes plywood, chipwood, dimensional lumber (2x4's, etc.), wood pallets, shavings and sawdust. Wood waste made up over half (51%) of the construction waste observed.



**Drywall:** Gypsum wallboard is a waste product from new construction. The drywall observed was usually unused with no nails or wood attached. Construction drywall waste made up 5.9% of the construction waste observed.

**Masonry:** Masonry waste consists of inert materials such as brick, concrete, rock, and dirt that originated at a construction site. Construction masonry is “cleaner” and “newer” than demolition masonry materials and in most cases looked like ‘clean fill’. Masonry materials from construction sites made up 7% of all construction waste.



**Metal:** Metal construction waste consisted of metal studs, aluminum siding, metal beams, metal dry wall strips, pipes, etc. Metal construction waste consisted of 3.4% of the entire construction waste sector.

**Plastic:** Plastic construction waste consisted of PVC pipe, vinyl siding, plastic buckets, Styrofoam insulation, and plastic sheeting. Plastic construction waste made up 8.4% of the construction waste sector.





**Cardboard:** Cardboard consists of boxes, box board, and cardboard packing materials. Cardboard waste made up 9.1% of the construction waste sector.



**Other Construction Waste:** All other materials originating from a new construction site was categorized as other construction waste. Other construction waste materials made up 5.2% of the construction waste sector.



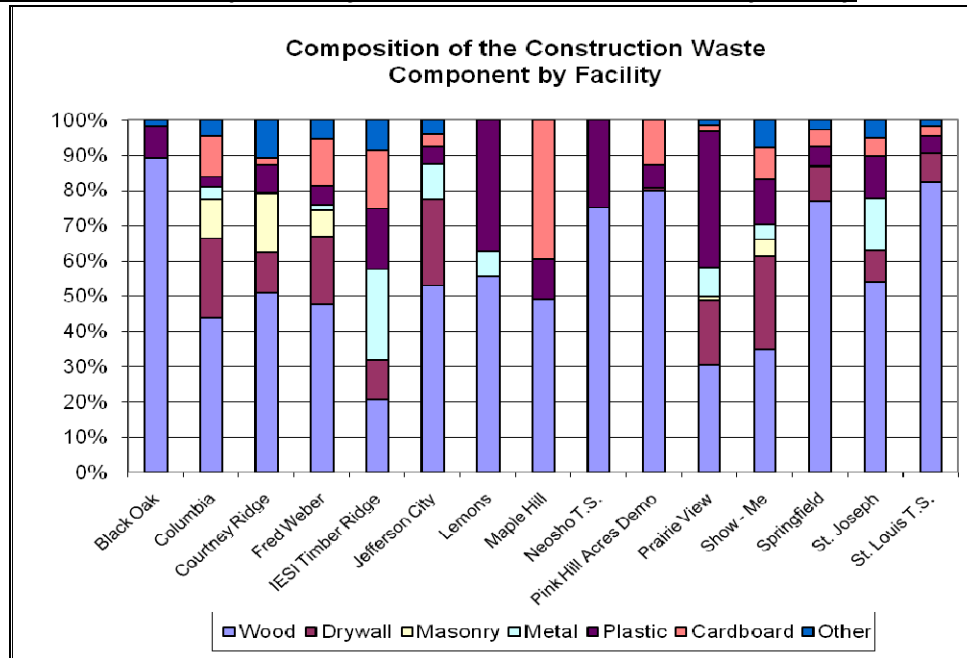
### Construction Waste Sector Findings

Based on the observations at 15 facilities throughout Missouri during the study period, about 1.6% of the total waste in Missouri is construction waste. This amount varied between waste facilities. The largest amount of construction waste received during the observation week was at the City of Columbia landfill. The smallest amount was received at the Neosho Transfer Station.

***Table II-1: Construction Waste by Facility***

Waste Facility	Tonnage Wood	Tonnage Drywall	Tonnage Masonry	Tonnage Metal	Tonnage Plastic	Tonnage Cardboard	Tonnage Other	Tonnage Total
Black Oak	14.7	0	0	0	1.5	0	0.3	16.5
Columbia	71.6	37.2	18.2	5.8	4.8	18.7	7.8	164.1
Courtney Ridge	69.1	15.7	22.6	0.4	10.8	2.8	14.5	135.9
Fred Weber	177.2	71.7	28.7	4.9	20.2	50.1	20.2	373
IESI Timber Ridge	5.5	3	0	6.9	4.6	4.4	2.3	26.7
Jefferson City	13.1	6	0	2.5	1.2	0.9	1	24.7
Lemons	5.5	0	0	0.7	3.7	0	0	9.9
Maple Hill	3.1	0	0	0	0.7	2.5	0	6.3
Neosho T.S.	1.8	0	0	0	0.6	0	0	2.4
Pink Hill Acres Demo	28.4	0.3	0	0	2.2	4.6	0	35.5
Prairie View	17.3	10.7	0.6	4.7	22	1	0.9	57.2
Show - Me	4.3	3.3	0.6	0.5	1.6	1.1	1	12.4
Springfield	33.7	4.4	0.1	0	2.3	2.2	1.2	43.9
St. Joseph	28.4	4.7	0	7.6	6.4	2.7	2.7	52.5
St. Louis T.S.	43.9	4.4	0	0	2.6	1.5	1	53.4
<b>Totals</b>	<b>517.6</b>	<b>161.4</b>	<b>70.8</b>	<b>34</b>	<b>85.2</b>	<b>92.5</b>	<b>52.9</b>	<b>1014.4</b>

**Chart II-1: Percent Composition of Construction Waste Observed by Facility**

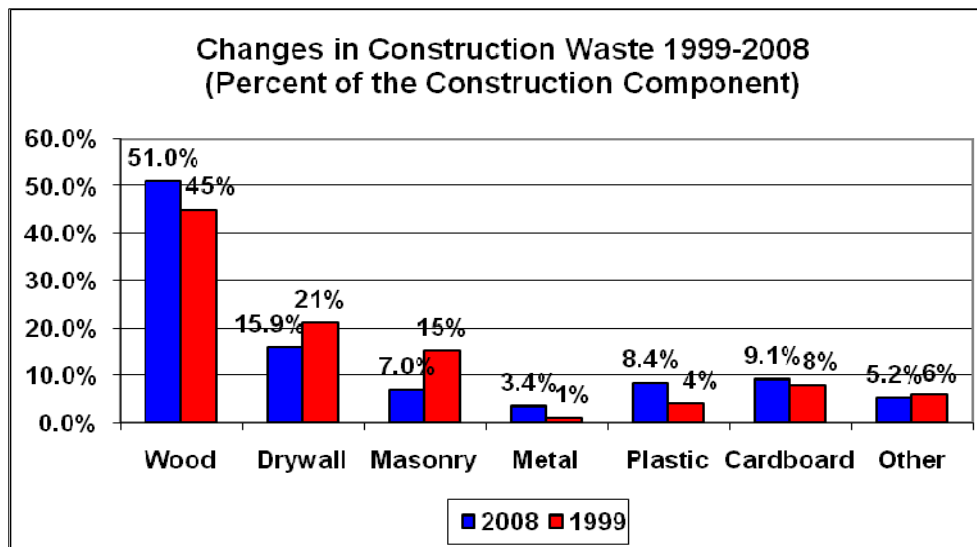


### Changes in the Construction Waste Sector

The percentage of construction waste was significantly lower in 2008 than it was during the 1999 study. The percentage of construction waste dropped from 5.5% in 1999 to 1.6% in 2008. According to the National Association of Home Builders (NAHB) housing starts in the Midwest region have dropped from 347 (thousands of units) in 1999 to 135 in 2008.

Housing starts are defined as the start of construction of a privately-owned housing unit when excavation begins for the footings or foundation of a building intended primarily as a housekeeping residential structure and designed for nontransient occupancy. This drop in residential construction correlates with the decrease in construction waste from 1999 to 2008 as noted above.

**Chart II-2: Construction Waste Changes from 1999-2008**



**Conclusions:**

Based on the percentage of construction waste observed during the study, approximately 95,468 tons of construction waste was disposed in 2007 (1.6% of 6,364,557 tons). Many of the components observed during the study are materials that can be reused or recycled, reducing the amount of waste being disposed. The table below estimates the amount of construction materials discarded in 2007.

***Table II-2: Estimated Construction Waste - 2007***

Construction Waste	Estimated Tons - 2007	Pct. of Total Waste
Wood	48689	0.82%
Drywall	15179	0.25%
Masonry	6683	0.11%
Metal	3246	0.05%
Plastic	8019	0.13%
Cardboard	8688	0.15%
Other	4964	0.08%
<b>Total</b>	<b>95468</b>	<b>1.60%</b>

**THE DEMOLITION WASTE SECTOR**

Demolition waste is normally 'lumped' together with construction waste and characterized as construction/demolition (C&D) waste. However, the demolition sector of C&D is quite different from the construction waste sector. Construction waste tends to be more homogeneous, cleaner, newer, unattached, and for the most part easier to separate and recover than the demolition waste sectors. Demolition waste tends to be mixed materials, older materials, attached materials, and much more difficult to separate and recover.

Waste was classified as demolition if the materials were attached to each other, pulverized, or unable to be easily separated. Demolition waste is normally delivered to a waste facility in a roll-off container brought directly from a demolition or renovation site. Most of the mixed demolition waste loads look like a bulldozer flattened a structure and the waste was dumped into the back of a truck with a scoop or grab claw.

Demolition loads normally contained several construction materials such as the one pictured on the right. The load on the left came from a store renovation, the load on the right came from a house demolition. In either case it would be difficult to separate out just one material for recovery.





Each of these loads was visually inspected and the weight of each material was estimated and expressed as a percentage of the entire load. That percentage was then applied to the scale weights to determine the weight of the material.

## The Demolition waste sector consisted of seven components:

**Wood:** Demolition waste wood is typically weathered, painted, and in many cases attached to other materials. The demolition load on the right is mixed with several materials and the wood is attached with nails and screws. Wood waste was the largest component and made up 47.4% of the demolition waste sector.



**Drywall:** Demolition drywall is gypsum wallboard that has been removed from a structure during demolition. The drywall observed was usually in small pieces, painted, and often attached to wood or metal studs. Demolition drywall waste made up 9.1% of the demolition waste observed.



**Roofing:** Demolition Roofing materials were comprised mostly of roofing shingles that were torn off of existing roofs in anticipation of putting new shingles on the structure. In most cases these shingles were delivered to the landfill in dump trucks or trailers. Some loads were homogeneous while others were mixed with wood scraps as shown in the photo on the left. Roofing made up 21.4% of the demolition waste sector.



**Masonry:** Demolition masonry consists of inert materials such as brick, concrete, rock, and dirt that originated at a demolition site. Demolition masonry materials were mixed with other materials and in most cases could not be used as 'clean fill'. Demolition masonry made up 13.8% of the demolition waste sector.



**Metal:** Demolition metal waste consisted of a variety of items. They included the normal construction type materials such as metal studs, aluminum siding, metal beams, metal dry wall strips, pipes, etc. Demolition metal waste also contained old metal equipment that was removed from facilities. Metal demolition waste consisted of 1.6% of the entire demolition waste sector.



**Carpet:** Carpet came to the landfills and transfer stations in two ways. The picture on the left shows a homogeneous load of carpet removed from buildings. Carpet also arrived mixed with other materials. The demolition carpet component comprised 5.4% of the demolition waste sector.



**Other:** Other demolition materials consisted of everything not listed previously that was removed and disposed of during the renovation and or demolition of a structure. These items included fiberglass and cellulose insulation, roofing insulation board, plastics, and small amounts of MSW and bulky items. The other demolition component waste made up 1.3% of the demolition waste sector.



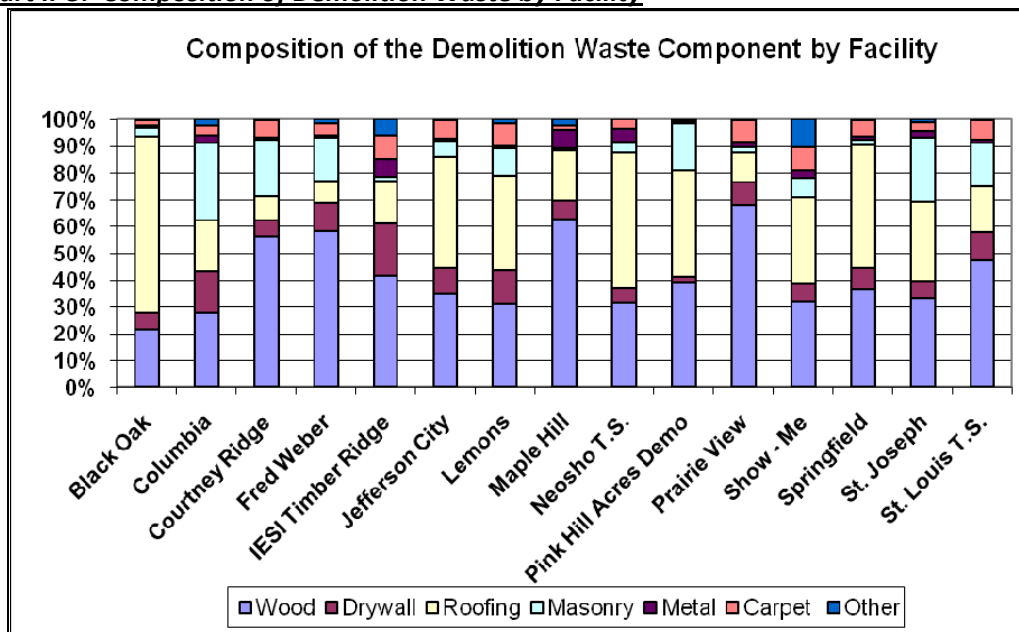
### Demolition Waste Sector Findings

Based on the observations at 15 facilities throughout Missouri during the study period, about 13.2% of the total waste in Missouri is demolition waste. This amount varied between waste facilities. The largest amount of demolition waste received during the study period was at the Fred Weber landfill. The smallest amount was received at the Neosho Transfer Station.

***Table II-3: Demolition Waste Observed by Facility***

Waste Facility	Tonnage Wood	Tonnage Drywall	Tonnage Roofing	Tonnage Masonry	Tonnage Metal	Tonnage Carpet	Tonnage Other	Tonnage Total
Black Oak	27.4	8	83.9	4.3	0.8	2.8	0.3	127.5
Columbia	199	111.9	138.1	211.2	20.3	26.6	17.1	724.2
Courtney Ridge	654.9	70.4	103.9	247.1	10.6	71.2	7	1165.1
Fred Weber	1146.2	205	166.6	316.2	12.8	92.8	31.3	1970.9
IESI Timber Ridge	124.5	58.6	47.1	5.3	19	26.9	18.8	300.2
Jefferson City	233.7	63.3	275.7	42.9	3.1	48.1	2.2	669
Lemons	100.3	42.3	115.7	33	2.6	27.2	5.9	327
Maple Hill	146	16.8	43.5	2	16	3.5	6.1	233.9
Neosho T.S.	16.4	3.1	26.5	2.1	2.6	2	0	52.7
Pink Hill Acres Demo	258.5	13.1	265.5	116.5	1.1	7.7	0.1	662.5
Prairie View	643	82.5	104.7	21.2	19.2	76.4	3.1	950.1
Show - Me	51.2	11.3	52.3	11.8	5	13.6	17.3	162.5
Springfield	177.3	36.9	222.2	9.3	5.6	31.3	0.8	483.4
St. Joseph	157.2	29.7	141.3	114.4	11.6	15.9	5.1	475.2
St. Louis T.S.	122.6	28.3	44.5	42.2	3	19.7	0.4	260.7
<b>Totals</b>	<b>4058.2</b>	<b>781.2</b>	<b>1831.5</b>	<b>1179.5</b>	<b>133.3</b>	<b>465.7</b>	<b>115.5</b>	<b>8564.9</b>

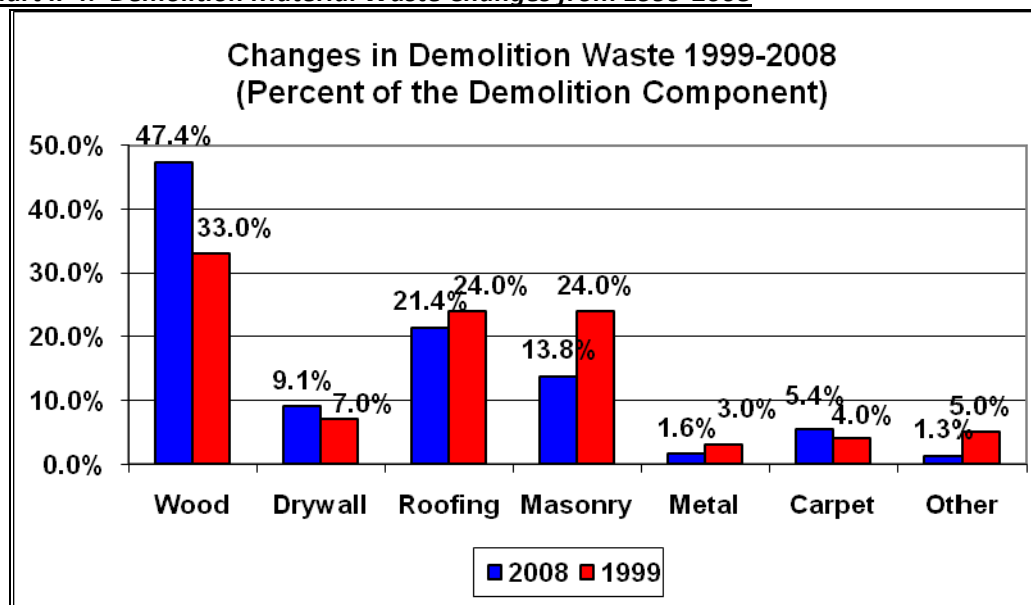
**Chart II-3: Composition of Demolition Waste by Facility**



### Changes in the Demolition Waste Sector

The percentage of demolition waste was about the same in 2008 than it was during the 1999 study. The percentage of demolition waste rose slightly from 13.0% in 1999 to 13.2% in 2008. The downturn in the economy in 2008 did not seem to significantly reduce the amount of demolition waste.

**Chart II-4: Demolition Material Waste Changes from 1999-2008**



### Conclusions:

Based on the percentage of demolition waste observed during the study, approximately 840,122 tons of demolition waste was disposed in 2007 (13.2% of 6,364,557 tons). Many of the components observed during the study are materials that can be reused or recycled, reducing the amount of waste being disposed. The table below estimates the amount of demolition materials discarded in 2007.

**Table II-4: Estimated Demolition Waste - 2007**

Demolition Waste	Estimated Tons - 2007	Pct. of Total Waste
Wood	398218	6.26%
Drywall	76451	1.20%
Roofing	179786	2.82%
Masonry	115936	1.82%
Metal	13442	0.21%
Carpet	45367	0.71%
Other	10922	0.17%
<b>Total</b>	<b>840122</b>	<b>13.20%</b>

### **THE INDUSTRIAL WASTE SECTOR**

Industrial waste is difficult to define. In the broadest sense all waste from commercial operations could fall into the industrial waste sector. The waste from a fast food restaurant is technically industrial processed waste because the waste (food scraps, paper, plastic) are all part of the manufacturing process resulting from the creation of a product. However, it is difficult to separate this waste from the normal MSW loads because this waste is collected by packer trucks that collect a variety of other wastes. The packer truck that collects the fast food restaurant typically makes hundreds of other stops at other small businesses, institutional facilities, and residences.

For the purposes of this study industrial waste fell into one or more of the following:

- Waste from an industrial, manufacturing, or commercial operation
- Waste that was visually homogeneous (all the same)
- Waste from a single generator and not combined with other generators
- Waste delivered to the landfill or transfer station in a dump truck, open top roll-off, or compactor unit

Industrial waste is normally separated from other materials and therefore easier to separate for recovery if there is value in the recovered material. The load of pallets on the right is 100% industrial wood (the byproduct of an industrial process). Like the other waste sectors, each of these loads was visually inspected and the weight of each material was estimated and expressed as a percentage of the



entire load. That percentage was then applied to the scale weights to determine the weight of the material.

**The Industrial waste sector consisted of nine components:**

**Cardboard:** Industrial cardboard consists of corrugated containers (whole, flattened, shredded, or baled). The industrial cardboard load on the right is mixed with several other materials. Cardboard is light but voluminous until compacted. Industrial cardboard made up 19.2% of the industrial waste sector. Cardboard boxes are easily recycled and could significantly reduce the amount of waste transported to, and received by the waste facilities.



**Paper:** Industrial paper included packing materials, wrapping waste, overruns from printing and office paper from a single source generator. The industrial paper on the right is waste gift wrap. Industrial paper waste made up 2.2% of the industrial waste observed.



**Food:** Industrial food was defined as human or animal food waste resulting from processing or overruns. Most loads were homogeneous such as the “chicken parts” shown in the photo on the left. Industrial food waste made up 11.9% of the industrial waste sector.



**Metal:** Industrial metal waste was defined as metallic wastes from a single source. Metallic sludge or byproducts from a smelting operation were listed in the “industrial other” category. The cans from a beverage processor on the right were out of date. Some were filled with liquid and some were empty. Industrial metal made up 1.0% of the industrial waste sector.



**Wood:** Industrial wood waste included wooden pallets, crating, and processed waste from manufactures such as wood shavings and sawdust. Pallets were the biggest material item in this category. Wood waste made up 14.3% of the entire industrial waste sector.



**Plastics:** Industrial plastic was defined as all manufactured plastic, plastic processed wastes, plastic packing materials and plastic resin sludge. The picture on the left is a polyvinyl plastic from a plastics manufacturer. Like cardboard, plastic is usually light but very voluminous. The industrial plastic component comprised 8.2% of the industrial waste sector.



**Textiles:** Industrial textiles included clothing, rags, and processed cloth waste from a single source. The picture on the left is textile waste from a clothing manufacturer. Industrial textiles made up 0.9% of the industrial waste sector.

**Rubber:** Industrial rubber waste includes auto and truck tires (Missouri laws requires tires to be shredded, split, or quartered if they are put into a landfill), and processed rubber waste materials and overruns from rubber manufacturers. The picture on the right is rubber waste from a belt manufacturer. Industrial rubber waste made up 3.0% of the industrial waste sector.



**Other:** Other industrial waste included all wastes from industrial sources that were not listed in the previous eight components. These material wastes included auto fluff, foundry sand, aluminum ore waste, and carbon black. The picture on the right is auto fluff and that was the most common industrial waste material. The industrial other waste component made up 39.3% of the industrial waste sector. This was by far the largest component of the industrial waste and auto fluff was by far the biggest material in this category.



### Industrial Waste Sector Findings

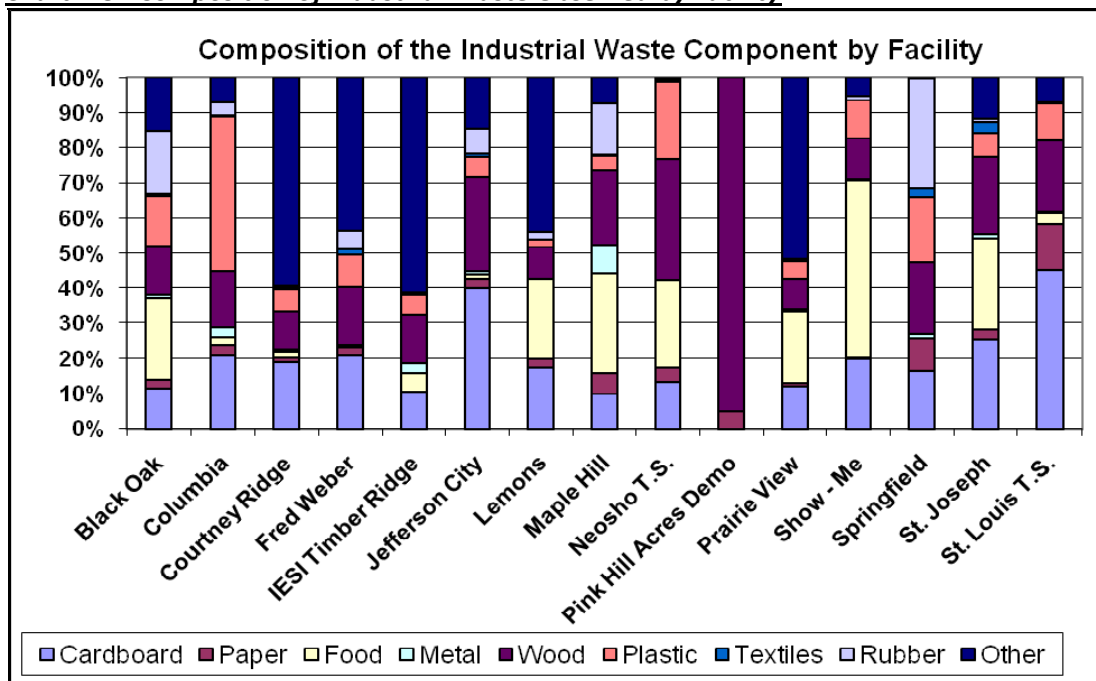
Based on the observations, about 10.7% of the total waste in Missouri is industrial waste. This amount varied between waste facilities. The largest amount of industrial waste received during the observation week was at the Courtney Ridge landfill. The smallest amount was received at the Pink Hill Acres Demolition Landfill.



**Table II-5: Industrial Waste Observed by Facility**

Waste Facility	Tonnage Cardboard	Tonnage Paper	Tonnage Food	Tonnage Metal	Tonnage Wood	Tonnage Plastic	Tonnage Textiles	Tonnage Rubber	Tonnage Other	Tonnage Total
Black Oak	8.5	1.9	17.5	0.8	10.5	10.7	0.5	13.5	11.4	<b>75.3</b>
Columbia	40.2	5.7	4	5.6	30.8	85.4	0.5	6.9	14	<b>193.1</b>
Courtney Ridge	412.6	29.5	38.7	14.8	239.4	134.4	16.9	5.8	1311.2	<b>2203.3</b>
Fred Weber	216	22.3	2.3	2.9	168.8	95.5	17.5	53	448.6	<b>1026.9</b>
IESI Timber Ridge	36.2	1.4	19.2	10	51.3	20.3	0	2.5	222.7	<b>363.6</b>
Jefferson City	115.1	7.4	3.8	2.8	76.9	17.1	2.9	20.2	42	<b>288.2</b>
Lemons	84.3	12.5	112.6	0	43.9	11.6	0	10.5	216.5	<b>491.9</b>
Maple Hill	17.9	11.4	52.7	14.6	39.9	7.9	0.1	26.8	13.9	<b>185.2</b>
Neosho T.S.	14.4	4.5	27.3	0	37.7	23.9	1.1	0.2	0.2	<b>109.3</b>
Pink Hill Acres Demo	0	0.3	0	0	5.9	0	0	0	0	<b>6.2</b>
Prairie View	121.8	9.8	209.4	5.9	87.7	50.8	4.2	2.9	528.4	<b>1020.9</b>
Show - Me	88.9	1.5	226.3	2	51.8	48.6	0	5.8	24	<b>448.9</b>
Springfield	34.7	19.6	0	3.2	43.2	40	5.2	66.5	0.9	<b>213.3</b>
St. Joseph	164.3	19.7	168.5	8.4	143.8	46.1	20.2	5.4	76.7	<b>653.1</b>
St. Louis T.S.	69.5	19.6	5.2	0.2	31.6	16.2	0.3	0	11	<b>153.6</b>
<b>Total</b>	<b>1424.4</b>	<b>167.1</b>	<b>887.5</b>	<b>71.2</b>	<b>1063.2</b>	<b>608.5</b>	<b>69.4</b>	<b>220</b>	<b>2921.5</b>	<b>7432.8</b>

**Chart II-5: Composition of Industrial Waste Observed by Facility**

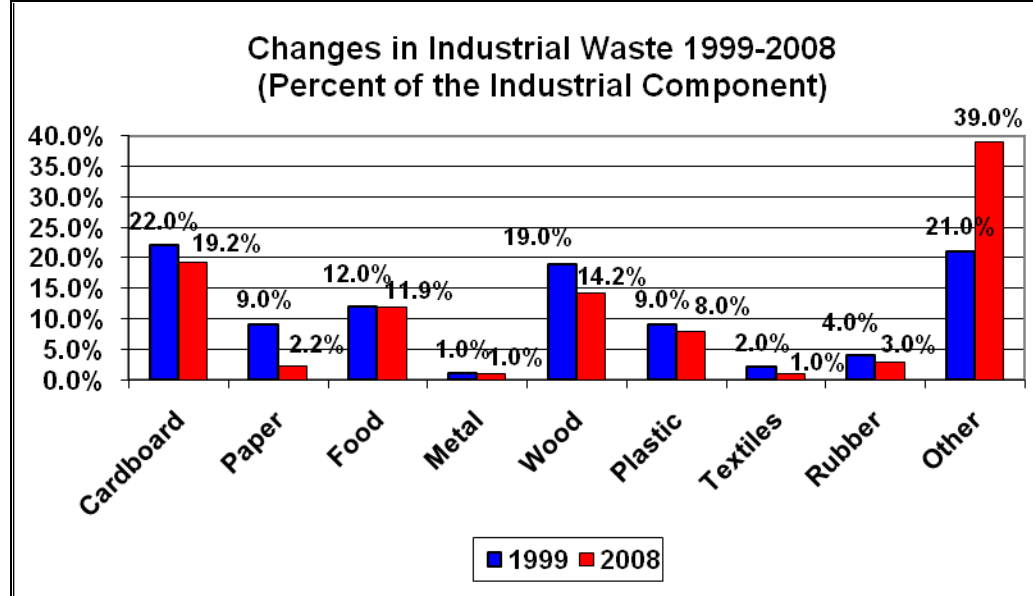


#### Changes in the Industrial Waste Sector

The percentage of industrial waste dropped slightly from 11.8% in 1999 to 10.7% in 2008.



**Chart II-6: Industrial Waste Changes from 1999-2008**



**Conclusions:**

Based on the percentage of industrial waste observed during the study, approximately 681,008 tons of industrial waste was disposed in 2007 (10.7% of 6,364,557 tons). Many of the components observed during the study are materials that can be reused or recycled, reducing the amount of waste being disposed. The table below estimates the amount of industrial materials discarded in 2007.

**Table II-6: Estimated Industrial Waste - 2007**

Industrial Waste	Estimated Tons - 2007	Pct. of Total Waste
Cardboard	130753	2.05%
Paper	14982	0.24%
Food	81040	1.27%
Metal	6810	0.11%
Wood	97385	1.53%
Plastic	55843	0.88%
Textiles	6129	0.10%
Rubber	20430	0.32%
Other	267636	4.21%
<b>Total</b>	<b>681008</b>	<b>10.70%</b>

**THE 'OTHER' WASTE SECTOR**

In the 1999 Missouri Waste Composition Study all materials that were not MSW, construction waste, demolition waste or industrial waste was classified as 'Other' waste. The four components of 'other' waste were bulky items, asbestos, soil, and other materials (mostly sludge and commercial yard waste). For purposes of this study, the Missouri Department of Natural Resource's Solid Waste Management Program split the 'Other' sector into two waste sectors, creating an 'Other' waste sector and a 'Special' waste sector. The 'Other' waste sector is now defined as municipal sewage sludge, unidentified sludge, commercial yard waste and stumps, and all other unidentified materials.



The 'Other' waste sector was easily identifiable from the waste sectors listed previously. Each of these loads was visually inspected and the weight of each material was estimated and expressed as a percentage of the entire load. That percentage was then applied to the scale weights to determine the weight of the material.

**The 'Other' waste sector consisted of two components:**

**Sludge:** Sludge was defined as Municipal sewage sludge from a wastewater plant, sludge containing animal waste, or unidentifiable sludge materials of unknown origins. Most of the waste in this component was sewage sludge. The load on the right is dewatered chicken sludge (chicken waste). Sludge made up 36% of the 'Other' waste sector.



**Tree Trunks:** Yard waste is banned from Missouri landfills. However, large tree limbs, tree trunks, and stumps are permitted. Some facilities enforced the ban very well and a minimal amount of this waste was seen. When banned yard waste was observed it was put into this waste sector. The picture on the right is a combination of stumps, limbs and roots. The tree trunk component made up about 64% of the 'Other' waste sector.



**'Other' Waste Sector Findings**

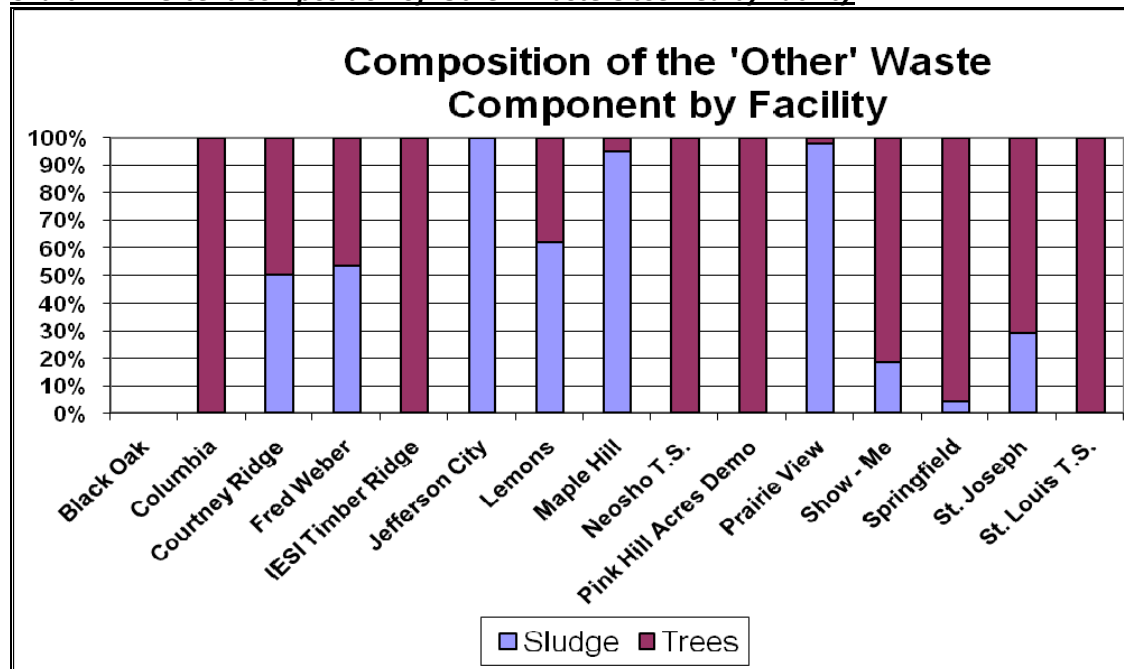
Based on the observations at 15 facilities throughout Missouri during the study period, about 2.5% of the total waste in Missouri is sludge and tree materials (Other) waste. This amount varied between waste facilities. The largest amount of "Other" waste received was during the observation week of 8/4-8/8/2008 at the St. Louis Transfer Station. This transfer station received large amounts of yard waste from the City of St. Louis, and this yard waste appeared to be contaminated with MSW and therefore could not be ground up for mulch/composting. Waste from this transfer station is shipped to a landfill in Illinois. At the time the observation activities were being conducted, former Governor Matt Blunt had issued Executive Order 08-26 extending the authority granted to the Director of the Missouri Department of Natural Resources to waive or suspend temporarily the operation

of statutory or administrative rules or regulations to expedite the cleanup and recovery process from the severe storms and subsequent flooding that began on June 1, 2008. A subsequent press release was issued by the department notifying the public that a temporary waiver of the ban on yard waste was being issued so storm debris could be landfilled in the state.

***Table II-7: 'Other' Waste Observed by Facility***

<b>Waste Facility</b>	<b>Tonnage Sludge</b>	<b>Tonnage Trees</b>	<b>Tonnage Total</b>
Black Oak	0	0	<b>0</b>
Columbia	0	10.2	<b>10.2</b>
Courtney Ridge	129.7	126.6	<b>256.3</b>
Fred Weber	200.2	174.6	<b>374.8</b>
IESI Timber Ridge	0	9.4	<b>9.4</b>
Jefferson City	2	0	<b>2</b>
Lemons	10.5	6.3	<b>16.8</b>
Maple Hill	9.8	0.5	<b>10.3</b>
Neosho T.S.	0	0.5	<b>0.5</b>
Pink Hill Acres Demo	0	1	<b>1</b>
Prairie View	156.7	3	<b>159.7</b>
Show - Me	27	119	<b>146</b>
Springfield	5.2	111.2	<b>116.4</b>
St. Joseph	7.3	17.5	<b>24.8</b>
St. Louis T.S.	0	402.7	<b>402.7</b>
<b>Total</b>	<b>548.4</b>	<b>982.5</b>	<b>1530.9</b>

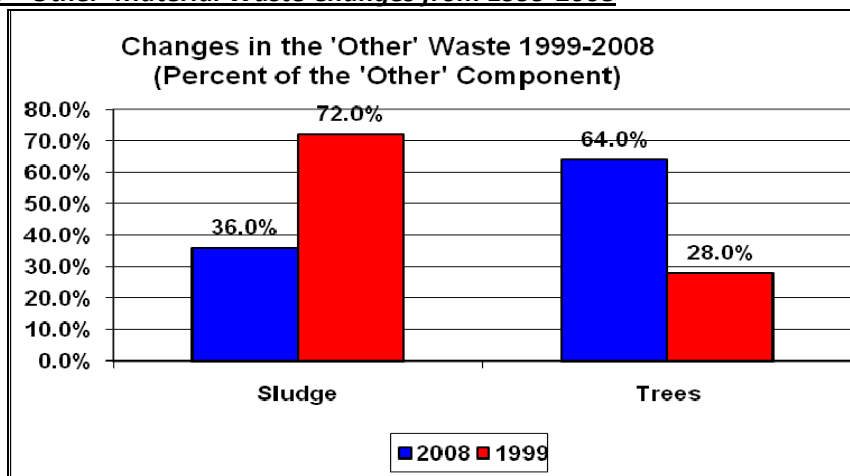
***Chart II-7: Percent Composition of 'Other' Waste Observed by Facility***



### Changes in the 'Other' Waste Sector

The percentage of 'other' waste was about two and a half times larger in 2008 than it was during the 1999 study. The percentage of 'other' waste increased from 1.0% in 1999 to 2.5% in 2008.

**Chart II-8: 'Other' Material Waste Changes from 1999-2008**



### Conclusions:

Based on the percentage of 'other' waste observed during the study (2.5%); approximately 159,114 tons of sludge and tree related material waste was disposed in 2007 (2.5% of 6,364,557 tons). The table below estimates the amount of 'Other' materials discarded in 2007.

**Table II-8: Estimated Other Waste – 2007**

Other Waste	Estimated Tons - 2007	Pct. of Total Waste
Sludge	57281	0.90%
Tree Trunks	101833	1.60%
<b>Total</b>	<b>159114</b>	<b>2.50%</b>

### THE SPECIAL WASTE SECTOR

The 1999 Missouri Waste Composition Study classified all materials that did not apply to previously defined waste sectors as the 'Other' waste sector. The Missouri Department of Natural Resource's Solid Waste Management Program split this sector into two waste sectors for the 2008 study. A 'Special' waste sector was added to better define the materials that do not fit into any of the previous categories. For the purposes of this study, Special waste includes bulky items (furniture, mattresses, large fixtures, etc.), asbestos, soil (contaminated by a pollutant), tritium (exit signs), and electronic waste.

Bulky waste and electronic wastes were usually combined with other waste sectors. Soil and asbestos were delivered to the landfill as homogeneous loads. Each of the Special waste loads was visually inspected and the weight of each material was estimated and expressed as a percentage of the entire load. That percentage was then applied to the scale weights to determine the weight of the material.

**The Special waste sector consisted of five components:**

**Bulky Items:** Bulky items are defined as MSW in origin but too large to be included with normal MSW bag waste. Bulky items include furniture, mattresses, box springs, bicycles, and non-electronic appliances. The picture on the right is typical of most bulky loads. Bulky items made up 13% of the special waste sector.



**Soil:** The soil waste component includes both contaminated and non contaminated soils. The soils come from Brownfield developments, petroleum spills, underground storage tank excavations, etc. The picture on the left is a load of soil that was contaminated by petroleum near an underground storage tank. Soil waste was very dense and made up 62% of the special waste sector.

**Asbestos:** Asbestos was used in insulation materials for several decades before it was found to be harmful to humans. The small fibers within the asbestos settle in the lung and cause serious health problems. For this reason asbestos is treated very differently when it is disposed in landfills. When an asbestos load reaches the landfill all non essential personnel are cleared from the area and the asbestos is buried and covered with waste or soil. The picture on the right shows boxed asbestos ready to be covered. Asbestos made up 26% of the special waste sector.



**Tritium:** Tritium is a substance used in commercial exit signs. No tritium was observed during the 691 hours of observation at the 15 waste facilities.



**Electronic Waste:** The study used the Wikipedia definition of electronic waste as any appliance made primarily of surplus, obsolete, broken or discarded electrical or electronic devices. Very small amounts of e-scrap were observed. The picture on the right is a big screen TV. E-scrap made up only 0.1% of the special waste sector.



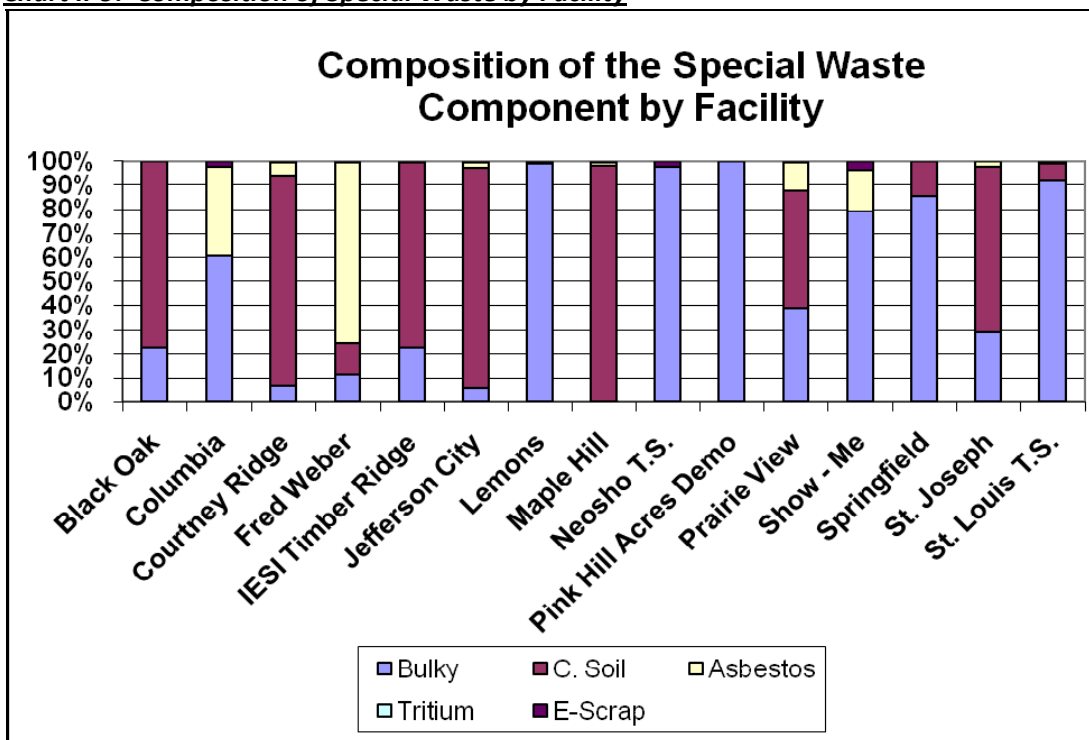
### Special Waste Sector Findings

Based on the observations, about 13.5% of the total waste in Missouri is special waste as defined by the Missouri Department of Natural Resource's Solid Waste Management Program. This amount varied between waste facilities. The largest amount of special waste received during the observation week was contaminated soil at the Courtney Ridge Landfill. The smallest amount was at the Pink Hill Acres Landfill.

**Table II-9: Special Waste Observed by Facility**

Waste Facility	Tonnage Bulky	Tonnage C. Soil	Tonnage Asbestos	Tonnage Tritium	Tonnage E-Scrap	Tonnage Total
Black Oak	4.7	16	0	0	0	20.7
Columbia	53.9	0	32.5	0	1.9	88.3
Courtney Ridge	228.3	2917.5	187.1	0	3.1	3336
Fred Weber	301.5	343.5	2004.4	0	0.3	2649.7
IESI Timber Ridge	22.5	75.8	0	0	0.5	98.8
Jefferson City	41.5	600.5	16.1	0	0.2	658.3
Lemons	63.5	0	0	0	0.7	64.2
Maple Hill	12.1	1329.6	24.3	0	0.7	1366.7
Neosho T.S.	4.6	0	0	0	0.1	4.7
Pink Hill Acres Demo	0.9	0	0	0	0	0.9
Prairie View	93.8	117.5	28.6	0	0.1	240
Show - Me	18.2	0	4	0	0.8	23
Springfield	37.7	6.4	0	0	0	44.1
St. Joseph	54.7	126.1	4.2	0	0	185
St. Louis T.S.	216.9	15.4	0	0	2.6	234.9
<b>Total</b>	<b>1154.8</b>	<b>5548.3</b>	<b>2301.2</b>	<b>0</b>	<b>11</b>	<b>9015.3</b>

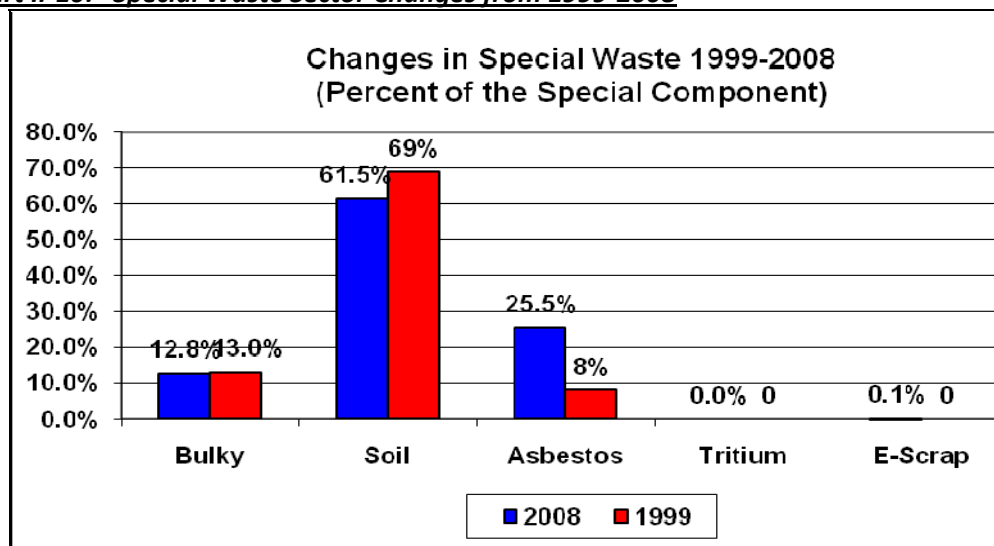
**Chart II-9: Composition of Special Waste by Facility**



#### Changes in the Special Waste Sector

The percentage of special waste increased from 9.2% in 1999 to 13.5% in 2008. Bulky items were virtually the same. The percentage of asbestos tripled from 9% in 1999 to 26% in 2008. The percentage of contaminated soil fell from 70% in 1999 to 61% in 2008.

**Chart II-10: Special Waste Sector Changes from 1999-2008**



**Conclusions:**

Based on the percentage of special waste observed during the study (13.5%); approximately 858,528 tons of special waste was disposed in 2007 (13.5% of 6,364,557 tons). The table below estimates the amount of special waste materials discarded in 2007.

**Table II-10: Estimated Special Waste - 2007**

<b>Special Waste</b>	<b>Estimated Tons - 2007</b>	<b>Pct. of Total Waste</b>
Bulky	109980	1.73%
Cont. Soil	528417	8.30%
Asbestos	219100	3.44%
Tritium	0	0.00%
E-Scrap	1031	0.02%
<b>Total</b>	<b>858528</b>	<b>13.5%</b>

**THE MUNICIPAL SOLID WASTE (MSW) SECTOR**

During this study, MSW loads were observed and recorded in order to determine what percentage of the entire waste stream was MSW. The MSW sector components were identified during the 2006-2007 study. The report in full can be viewed on the Missouri Department of Natural Resources Solid Waste Management Program web site.

(<http://www.dnr.mo.gov/env/swmp>) MWW sector components as identified in the 2006-2007 study are exhibited in the table below.

**Table II-11: MSW Composition by Weight**

<b>MSW Components</b>	<b>Wt.(lbs.)</b>	<b>Pct. by Wt.</b>
Cardboard	4884	8.20%
Newsprint	3076	5.17%
Magazines	2181	3.66%
High Grade Paper	3809	6.40%
Mixed Paper	6075	10.20%
<b>TOTAL PAPER</b>	<b>20025</b>	<b>33.63%</b>
Clear Glass	1616	2.71%
Brown Glass	1054	1.77%
Green Glass	374	0.63%
Other Glass	193	0.32%
<b>TOTAL GLASS</b>	<b>3237</b>	<b>5.44%</b>
Aluminum Cans	946	1.59%
Other Aluminum	200	0.34%
Non Ferrous	137	0.23%
Food Cans	1747	2.93%
Ferrous	518	0.87%
Oil filters	48	0.08%
<b>TOTAL METALS</b>	<b>3596</b>	<b>6.04%</b>
PET #1	1516	2.55%
HDPE #2	1129	1.90%
Plastic Film	2869	4.82%
Other Plastic	4756	7.99%
<b>TOTAL PLASTIC</b>	<b>10270</b>	<b>17.25%</b>
Food Waste	10254	17.22%
Wood Waste	709	1.19%
Textiles	2817	4.73%
Diapers	3264	5.48%
Other Organics	1766	2.97%
<b>TOTAL ORGANICS</b>	<b>18810</b>	<b>31.59%</b>
Fines	554	0.93%
Other Inorganics	1912	3.21%
<b>TOTAL INORGANICS</b>	<b>2466</b>	<b>4.14%</b>
HHW	547	0.92%
Electronic Waste	588	0.99%
<b>TOTAL SPECIAL WASTE</b>	<b>1135</b>	<b>1.91%</b>
<b>TOTAL MSW</b>		
<b>SAMPLE COMPOSITION</b>	<b>59539</b>	<b>100%</b>

**Conclusions:**

After observing and characterizing the overall waste stream, the percentage of MSW in Missouri is determined to be 58.3%. Based on the observation of all waste during the 2008 study, approximately 3,710,537 tons of MSW was disposed in 2007. The percentage and tonnage of MSW components for 2007 are in the following table.



**Table II-12: Estimated Municipal Solid Waste - 2007**

<b>MSW Components</b>	<b>Estimated Tons - 2007</b>	<b>Pct. of Total Waste</b>
Cardboard	304226	4.78%
Newsprint	191573	3.01%
Magazines	136202	2.14%
High Grade Paper	237398	3.73%
Mixed Paper	378691	5.95%
<b>TOTAL PAPER</b>	<b>1248090</b>	<b>19.61%</b>
Clear Glass	100560	1.58%
Brown Glass	65555	1.03%
Green Glass	23549	0.37%
Other Glass	12093	0.19%
<b>TOTAL GLASS</b>	<b>201756</b>	<b>3.17%</b>
Aluminum Cans	59190	0.93%
Other Aluminum	12729	0.20%
Non Ferrous	7637	0.12%
Food Cans	108834	1.71%
Ferrous	32459	0.51%
Oil filters	3182	0.05%
<b>TOTAL METALS</b>	<b>224032</b>	<b>3.52%</b>
PET #1	94195	1.48%
HDPE #2	70647	1.11%
Plastic Film	178844	2.81%
Other Plastic	296588	4.66%
<b>TOTAL PLASTIC</b>	<b>640274</b>	<b>10.06%</b>
Food Waste	639002	10.04%
Wood Waste	43915	0.69%
Textiles	175662	2.76%
Diapers	203666	3.20%
Other Organics	110107	1.73%
<b>TOTAL ORGANICS</b>	<b>1172351</b>	<b>18.42%</b>
Fines	34369	0.54%
Other Inorganics	119017	1.87%
<b>TOTAL INORGANICS</b>	<b>153386</b>	<b>2.41%</b>
HHW	34369	0.54%
Electronic Waste	36278	0.57%
<b>TOTAL SPECIAL WASTE</b>	<b>70647</b>	<b>1.11%</b>
<b>TOTAL MSW</b>	<b>3710537</b>	<b>58.30%</b>

## Section III

### **CHANGES IN THE WASTE STREAM OVER TIME**

Like most things in our fast paced society, waste composition changes over time.

Eight of the landfills that were studied in 1999 were observed again in 2008. Comparing the change in waste sectors and components for those eight facilities provides an opportunity to see trends in the Missouri waste composition.

The MSW Sector was 59.6% in 1999. The MSW sector at the eight landfills that were observed in 2008 remained virtually the same at 58.3%. The landfills with the greatest change had major changes in service providers delivering waste and/or other facilities nearby that opened or closed.

***Table III-1: Changes in the MSW Sector***

<b>Facility-MSW</b>	<b>2008</b>	<b>1999</b>
Black Oak	96.6%	95.0%
Columbia	64.0%	58.0%
Courtney Ridge	33.2%	59.0%
Fred Weber	46.8%	31.0%
Lemons	59.8%	71.0%
Maple Hill	53.7%	78.0%
Prairie View	69.2%	77.0%
St. Joseph	53.7%	25.0%
<b>Statewide</b>	<b>58.3%</b>	<b>59.6%</b>

The Construction Sector was 5.5% in 1999. The 2008 study found construction waste was drastically reduced to 1.6%. As noted earlier in the report, new home construction was down drastically in 2008 which translated into a drop in construction waste.

***Table III-2: Changes in the Construction Waste Sector***

<b>Facility-Construction</b>	<b>2008</b>	<b>1999</b>
Black Oak	0.2%	0.5%
Columbia	5.0%	7.4%
Courtney Ridge	1.3%	4.8%
Fred Weber	3.1%	16.0%
Lemons	0.4%	0.4%
Maple Hill	0.2%	0.8%
Prairie View	0.7%	0.7%
St. Joseph	1.7%	3.7%
<b>Statewide</b>	<b>1.6%</b>	<b>5.5%</b>



***Table III-3: Changes in Demolition Waste Sector***

The demolition waste sector remained relatively constant between 1999 and 2008. In 1999 the demolition waste sector was 13.0%. The 2008 demolition waste sector was 0.2% more (13.2%). The same economic conditions that caused a drop in the construction sector did not seem to affect the demolition waste sector.

<b>Facility-Demolition</b>	<b>2008</b>	<b>1999</b>
Black Oak	1.8%	1.0%
Columbia	22.1%	13.7%
Courtney Ridge	11.0%	7.0%
Fred Weber	16.4%	34.4%
Lemons	14.4%	7.3%
Maple Hill	6.0%	8.3%
Prairie View	12%	6.8%
St. Joseph	16%	20.9%
<b>Statewide</b>	<b>13.2%</b>	<b>13.0%</b>

***Table III-4: Changes in Industrial Waste Sector***

The Industrial Waste Sector was 11.8% of the total waste stream in 1999. That percentage dropped 1.1% in 2008. Seven of the eight landfills were close to 1999 percentages.

<b>Facility-Industrial</b>	<b>2008</b>	<b>1999</b>
Black Oak	1.1%	1.6%
Columbia	5.9%	18.1%
Courtney Ridge	20.7%	20.0%
Fred Weber	8.5%	6.8%
Lemons	21.7%	20.8%
Maple Hill	4.8%	10.8%
Prairie View	12.9%	14.9%
St. Joseph	21.8%	22.9%
<b>Statewide</b>	<b>10.7%</b>	<b>11.8%</b>

***Table III-5: Changes in 'Other' and Special Waste Sector***

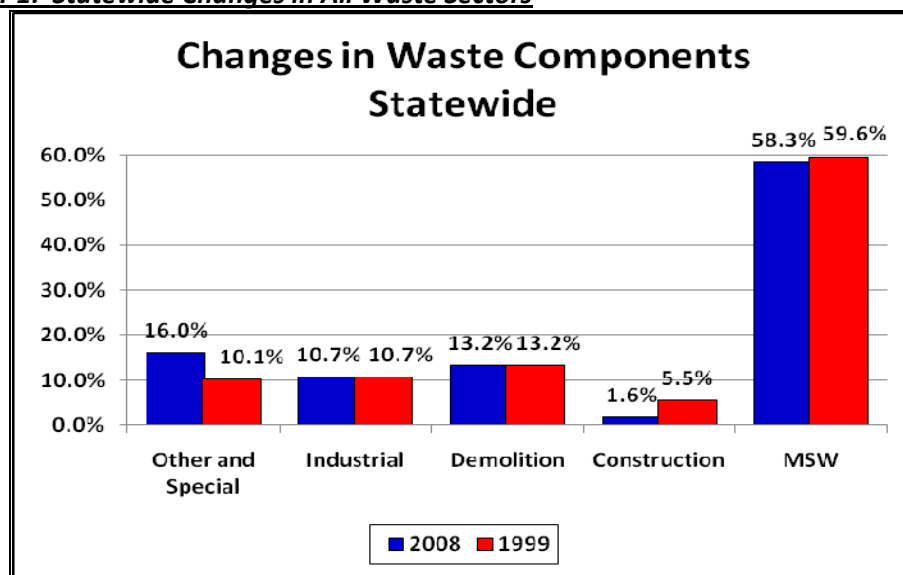
The 'Other' waste sector and the special waste sector were combined in 1999. There were significant changes between the two studies. The statewide percentage increased by 5.9% from 1999 to 2008. Most of that increase was contaminated soil.

<b>Facility-Special &amp; Other</b>	<b>2008</b>	<b>1999</b>
Black Oak	0.3%	1.4%
Columbia	3.0%	2.9%
Courtney Ridge	32.8%	9.1%
Fred Weber	25.2%	11.6%
Lemons	3.6%	0.5%
Maple Hill	35.4%	2.3%
Prairie View	5.1%	0.9%
St. Joseph	7.0%	27.4%
<b>Statewide</b>	<b>16.0%</b>	<b>10.1%</b>

The waste sector percentages for the 15 landfills and transfer stations that were observed were fairly similar to the percentages found in 1999 in three of the five sectors. The MSW sector (59.6% in 1999 vs. 58.3% in 2008) was relatively the same, changing less than 1% over the last decade. The demolition waste sector (13.0% in 1999 vs. 13.2% in 2008) was almost identical. The industrial waste sector (11.8% in 1999 vs. 10.7% in 2008) was lower but not significantly so.

Two of the waste sectors changed noticeably. The construction waste sector was less than a third (5.5% in 1999 vs. 1.6% in 2008) of what it was a decade ago. The Special/Other waste sector was significantly higher (10.1% in 1999 vs. 16.0% in 2008) than it was ten years ago. The statewide changes in the major waste sectors are displayed in the chart below.

**Chart III-1: Statewide Changes in All Waste Sectors**



**DIFFERENCES IN THE WASTE STREAM BASED ON DEMOGRAPHICS**

Missouri has three distinct demographic divisions. According to U.S. Census estimates the 2007 Missouri population was 5,842,713.

- 62% live in either the St. Louis Metro area or the Kansas City Metro area
- 11% live in one of the small metro areas (Springfield, Joplin, Columbia, or St. Joseph)
- 27% live in rural areas

The composition and quantity of waste generated from each of these demographic units may be slightly different.

**Large Metro Areas:**

There are two large metropolitan areas in Missouri: Kansas City and St. Louis. Each of these areas has a different solid waste profile. **The Kansas City area** has two sanitary landfills (Courtney Ridge and the City of Lee's Summit) and one demolition landfill (Pink Hill Acres). The combined 2007 tonnage for these three landfills was 641,962. Courtney Ridge and Pink Hill Acres were observed during the study. The waste sector percentages for these landfills are listed in Table III-6:

**Table III-6: Kansas City Area Waste Sector Percentages**

KC Area Landfill	% MSW	% Const.	% Demo.	% Ind.	% Other	% Special
Courtney Ridge	33.2%	1.3%	11.0%	20.7%	2.4%	31.4%
Pink Hill Acres	0.0%	5.1%	93.8%	0.9%	0.1%	0.1%

If the Lee's Summit landfill composition is the same as the Courtney Ridge composition, the estimated waste sector tonnage for the Kansas City area (using the percentages in Table III-6) is estimated in Table III-7:

**Table III-7: Kansas City Area Waste Sector Tonnage**

KC Area	2007	Estimated	Estimated	Estimated	Estimated	Estimated	Estimated
Landfill	Tonnage	MSW Tons	Const. Tons	Demo. Tons	Ind. Tons	Other Tons	Special Tons
Courtney Ridge	520394	172771	6765	57243	107722	12489	163404
Lee's Summit	86909	28854	1130	9560	17990	2086	27289
Pink Hill Acres	34659	0	1768	32510	312	35	35
<b>Total KC Area</b>	<b>641962</b>	<b>201625</b>	<b>9663</b>	<b>99313</b>	<b>126024</b>	<b>14610</b>	<b>190728</b>

The **St. Louis area** has two sanitary landfills (Fred Weber and Oak Ridge), two demolition landfills (Peerless and Rock Hill) and four transfer stations that ship waste out of state (Bridgeton TS, St. Louis north TS, St. Louis south TS, and the St. Louis waste TS). The combined 2007 tonnage for these eight facilities was 2,381,243.

The Fred Weber landfill and the St. Louis north Transfer Station were observed during the study. The waste sector percentages for these facilities are listed in Table III-8:

**Table III-8: St. Louis Area Waste Sector Percentages**

St. Louis Area Facilities	% MSW	% Const.	% Demo.	% Ind.	% Other	% Special
Fred Weber	46.8%	3.1%	16.4%	8.6%	3.1%	22.0%
St. Louis North TS	65.1%	1.7%	8.2%	4.9%	12.7%	7.4%

If the Oak Ridge landfill composition is the same as the Fred Weber composition, the Peerless and Rock Hill composition is similar to the Pink Hill Acres composition, and all of the transfer station composition is similar, the estimated waste sector tonnage for the St. Louis area (using the percentages listed in Table III-8) is estimated in Table III-9:

**Table III-9: St. Louis Area Waste Sectors**

St. Louis Area Facilities	2007 Tonnage	Estimated MSW Tons	Estimated Const. Tons	Estimated Demo. Tons	Estimated Ind. Tons	Estimated Other Tons	Estimated Special Tons
Fred Weber	995443	465867	30859	163253	85608	30859	218997
Oak Ridge	149378	69909	4631	24498	12847	4631	32863
Peerless	155798	0	7946	146139	1402	156	156
Rock Hill	95808	0	4886	89868	862	96	96
North TS	202891	132082	3449	16637	9942	25767	15014
South TS	117510	76499	1998	9636	5758	14924	8696
St. Louis TS	250790	163264	4263	20565	12289	31850	18558
Bridgeton TS	413625	269270	7032	33917	20268	52530	30608
<b>Total St. Louis Area</b>	<b>2381243</b>	<b>1176891</b>	<b>65064</b>	<b>504513</b>	<b>148976</b>	<b>160813</b>	<b>324988</b>

### Small Metro Areas:

There are four small metro areas in Missouri: Springfield, Joplin, St. Joseph, and Columbia. Joplin waste is sent to the Prairie View Landfill in Lamar, MO. However, the Joplin waste is only a portion of the waste received at Prairie View. The remaining three metro areas each have their own municipal landfill. The waste sector percentage for each facility is listed in Table III-10.

***Table III-10: Small Metro Waste Sector Percentages***

<b>Small Metro Landfill</b>	<b>% MSW</b>	<b>% Const.</b>	<b>% Demo.</b>	<b>% Ind.</b>	<b>% Other</b>	<b>% Special</b>
Columbia	64.0%	0.5%	22.1%	5.9%	0.3%	2.7%
Springfield	50.0%	2.4%	26.9%	11.8%	6.6%	2.4%
St. Joseph	53.7%	1.7%	15.8%	21.8%	0.8%	6.2%

The estimated waste sector tonnage for each of the small metro areas (using the percentages listed in Table III-10) is estimated in table III-11:

***Table III-11: Small Metro Area Waste Sectors***

<b>Small Metro Landfills</b>	<b>2007 Tonnage</b>	<b>Estimated MSW Tons</b>	<b>Estimated Const. Tons</b>	<b>Estimated Demo. Tons</b>	<b>Estimated Ind. Tons</b>	<b>Estimated Other Tons</b>	<b>Estimated Special Tons</b>
Columbia	175175	112112	8759	38714	10335	526	4730
Springfield	103140	51570	2475	27745	12171	6704	2475
St. Joseph	136964	73550	2328	21640	29858	1096	8492
<b>Total Small Metro</b>	<b>415279</b>	<b>237232</b>	<b>13562</b>	<b>88099</b>	<b>52364</b>	<b>8326</b>	<b>15697</b>

It is difficult to find any reliable statistical similarities in the waste composition between the three small metropolitan areas. Columbia has a municipal collection service and therefore controls their waste flow to a certain degree. The St. Joseph composition depends to a large degree on where the MSW service providers take their waste (there is a nearby landfill in Kansas). Much of the Springfield city waste is collected by WCA and Allied Waste, much of which is transferred to Black Oak (WCA facility) and Prairie View (Allied Waste facility).

#### **Rural Areas:**

About 27% of Missouri residents live in rural areas. Seven rural landfills and one rural transfer station were observed during the study:

- Black Oak landfill near Hartville
- IESI Timber Ridge landfill in Washington County
- Jefferson City in Cole County
- Lemons landfill near Dexter
- Maple Hill landfill near Macon
- Prairie View landfill near Lamar
- Show Me near Warrensburg
- The Neosho Transfer Station in Newton County

The waste sector percentage for each facility is listed in Table III-12.

**Table III-12: Rural Waste Sector Percentages**

<b>Rural Landfills &amp; TS</b>	<b>% MSW</b>	<b>% Const.</b>	<b>% Demo.</b>	<b>% Ind.</b>	<b>% Other</b>	<b>% Special</b>
Black Oak LF	96.6%	0.2%	1.8%	1.1%	0.0%	0.3%
IESI Timber Ridge LF	78.7%	0.7%	8.0%	9.7%	0.3%	2.6%
Jefferson City LF	52.5%	0.7%	19.3%	8.3%	0.1%	19.1%
Lemons LF	59.8%	0.4%	14.4%	21.7%	0.7%	2.8%
Maple Hill LF	53.7%	0.2%	0.6%	4.7%	0.3%	35.1%
Prairie View LF	69.2%	0.7%	12.1%	12.9%	2.0%	3.1%
Show-Me LF	80.4%	0.3%	4.0%	11.1%	3.6%	0.6%
Neosho TS	57.9%	0.6%	13.1%	27.1%	0.1%	1.2%

The estimated waste sector tonnage for each of the rural area landfills and transfer stations (using the percentages listed in Table III-12) is estimated in table III-13:

**Table III-13: Rural Area Waste Sectors**

<b>Rural Landfills &amp; TS</b>	<b>2007 Tonnage</b>	<b>Estimated MSW Tons</b>	<b>Estimated Const. Tons</b>	<b>Estimated Demo. Tons</b>	<b>Estimated Ind. Tons</b>	<b>Estimated Other Tons</b>	<b>Estimated Special Tons</b>
Black Oak LF	362734	350401	725	6529	3990	0	1088
IESI Timber Ridge LF	172796	135990	1210	13824	16761	518	4494
Jefferson City LF	200218	105114	1402	38642	16619	200	38242
Lemons LF	108696	65000	435	15652	23587	762	3043
Maple Hill LF	168386	90423	337	10103	7914	505	59103
Prairie View LF	581253	402227	4068	70332	74982	11625	18019
Show-Me LF	173894	139813	522	6956	19302	6260	1043
Neosho TS	18683	10817	112	2447	5063	19	224
<b>Total Rural</b>	<b>1786660</b>	<b>1299785</b>	<b>8811</b>	<b>164485</b>	<b>168218</b>	<b>19889</b>	<b>125256</b>

On average, rural landfills and transfer stations received a greater percentage of MSW and a smaller percentage of construction, demolition, industrial, and special waste.

### Demographic Conclusions:

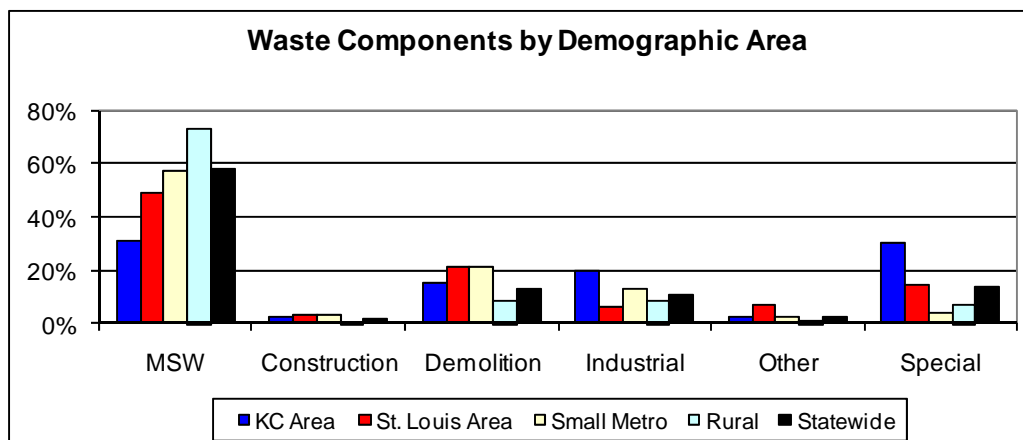
There are some noticeable trends when the waste sectors are compared demographically. Table III-14 lists the percentage of each major waste sector by demographic area. Chart III-2 provides the same information graphically.

**Table III-14: Waste Sector Percentages by Demographic Area**

<b>Demographic Area</b>	<b>% MSW</b>	<b>% Const.</b>	<b>% Demo.</b>	<b>% Ind.</b>	<b>% Other</b>	<b>% Special</b>
KC Area	31%	2%	15%	20%	2%	30%
St. Louis Area	49%	3%	21%	6%	7%	14%
Small Metro	57%	3%	21%	13%	2%	4%
Rural	73%	1%	9%	9%	1%	7%
Statewide	58.3%	1.6%	13.2%	10.7%	2.5%	13.5%

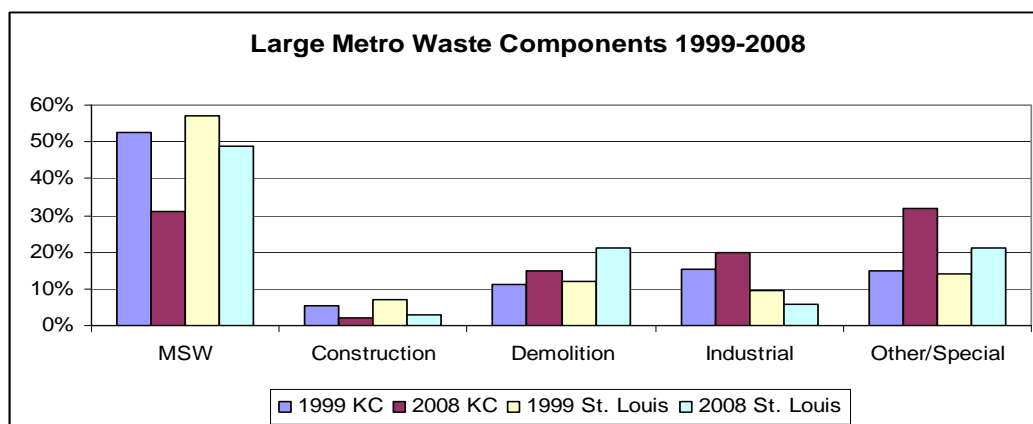


**Chart III-2: Waste Sector Percentages by Demographic Area**



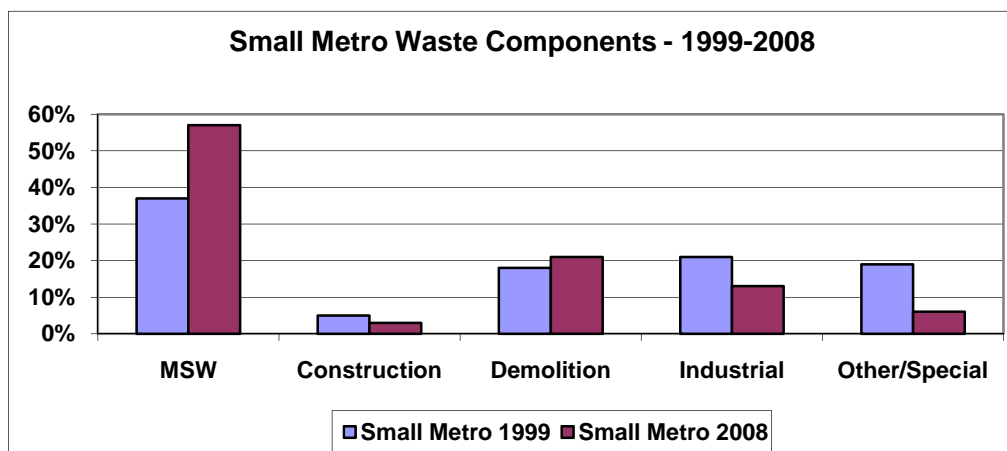
The most noticeable difference between the demographic areas is the percentage of MSW. The MSW percentage in the large metro areas is considerably less than the statewide average percentage. In contrast the rural MSW percentage is considerably higher. The 2008 waste sectors for the large metro were similar to the 1999 percentages with one major exception. During the observation week at the Courtney Ridge landfill in Kansas City there was a large amount of contaminated soil (2917 tons) that skewed all of the other waste sector percentages. Comparisons can be seen in Chart III-3.

**Chart III-3: Waste Sector Changes in the Large Metro Areas**



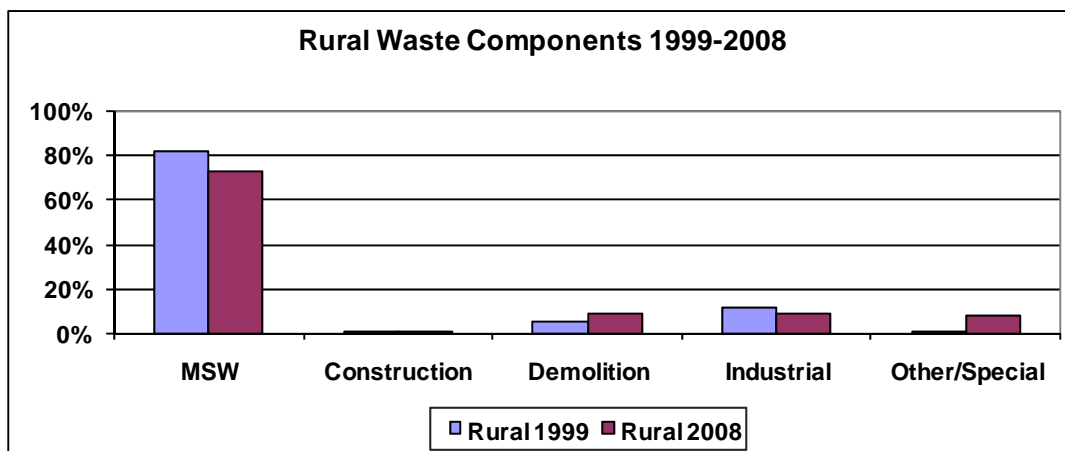
The Small Metro landfill waste sectors changed over the ten year period from 1999-2008. All three landfills (Columbia, Springfield, and St. Joseph) received a higher percentage of MSW in 2008. 2008 construction and demolition waste sectors were comparable to the 1999 levels but industrial and other/special waste sectors showed a lower percentage. Comparisons can be seen in Chart III-4.

**Chart III-4: Waste Sector Changes in the Small Metro Areas**



The rural waste sectors changed very little in the last ten years. The percentage of MSW changed slightly (9% less in 2008 than in 1999) and there was more other/special waste due to the large amount of contaminated soil received at the Maple Hill landfill during the observation week. The percentage of the remaining waste sectors remained relatively the same. Comparisons can be seen in Chart III-5.

**Chart III-5: Waste Sector Changes in the Rural Areas**



### **Variables in the Missouri Waste Composition:**

**Contaminated Soil:** Observing the landfills during the 1999 and 2008 study periods and writing the reports for each of these studies has shown that the largest variable from one week to the next and one landfill to the next is the amount of contaminated soil received. All other waste sectors are relatively stable and can be predicted with some degree of reliability from one week to the next. However, contaminated soil is very heavy and the amount of soil and the occurrence of projects cannot be predicted. During the 2008 study 5,548 tons (8.2% of the total waste observed) of contaminated soil was delivered to the landfills during the observation periods. This percentage could change from week to week depending on the location and scope of the contaminated soil projects.

**Service Provider Changes:** Private service providers account for the vast majority of MSW waste collection in Missouri. Contracts are constantly changing and many times waste is delivered to a different landfill or transfer station because the service provider owns that facility. This changes the composition of the sectors delivered to the individual landfill or transfer station over time.

**Exported Waste:** Some of the waste collected in Missouri is exported to surrounding states, with Kansas and Illinois receiving the majority of the export. In calendar year 2007 approximately 2,181,426 tons of waste were exported to surrounding states (Arkansas, Illinois, Iowa, Kansas, Kentucky, and Tennessee). (Source: The Missouri Department of Natural Resources 2007 Waste Diversion Report.)

**Landfill Closings:** As landfills close the waste is distributed to other available landfills. In 1999 two large landfills were part of the study, Southeast in KC and the Bridgeton Landfill in St. Louis. It is difficult to determine where the waste from these closed facilities has gone and how that changed the composition of waste for these areas in 2008.

# **Section IV**

## **Reports on the Landfills and Transfer Stations Observed**

**Black Oak Landfill**

**City of Columbia Landfill**

**City of Springfield Landfill**

**City of St. Joseph Landfill**

**Courtney Ridge Landfill**

**Fred Weber Landfill**

**IESI Timber Ridge Landfill**

**Jefferson City Landfill**

**Lemons Landfill**

**Maple Hill Landfill**

**Neosho Transfer Station**

**Pink Hill Acres Demolition Landfill**

**Prairie View Landfill**

**Show-Me Landfill**

**St. Louis North Metro Transfer Station**

## Black Oak Sanitary Landfill

### Wright County, Missouri

#### Introduction

Waste Corporation of America (WCA) owns and operates the Black Oak sanitary landfill in Wright County, MO. According to DNR tonnage reports the Black Oak Landfill received 362,734 tons of waste in 2007.

Waste disposal was observed at the Black Oak Landfill between Monday July 14, 2008 and Friday July 18, 2008. Observation took place between 6:30 AM and 4:30 PM each day for a total of 50 hours. During the observation period, 369 vehicles unloaded 7,052.3 tons of waste into the landfill. The breakdown by day is as follows:

#### Data Collection

Day	# of Vehicles	Weight in Tons
Monday 7/14	81	1502.2
Tuesday 7/15	77	1488.9
Wednesday 7/16	68	1317.7
Thursday 7/17	76	1413.7
Friday 7/18	67	1329.8
<b>Week's Total</b>	<b>369</b>	<b>7052.3</b>

During the observation week the waste composition was visually assessed and categorized into the following major sectors:

Type of waste	Weight in Tons	Percent of the Total
MSW	6812.5	97%
Construction	16.5	0%
Demolition	127.5	2%
Industrial	75.2	1%
Other	0	0%
Special	20.7	0%
<b>Week's Total</b>	<b>7052.3</b>	<b>100%</b>

#### Municipal Solid Waste (MSW)

The Municipal Solid Waste (MSW) sector was 96.6% (6812.5 tons) of the total waste. MSW was by far the biggest waste sector at Black Oak and was delivered to the landfill primarily by transfer trailers. Transfer trailers originated in West Plains, St. Roberts, Phelps Co., Lebanon, Taney Co., Verona, and Springfield. The daily breakdown was:

Day	Weight in Tons	Percent of the Total
Monday 7/14	1446.7	96%
Tuesday 7/15	1423.0	96%
Wednesday 7/16	1293.3	98%
Thursday 7/17	1356.4	96%
Friday 7/18	1293.0	97%
<b>Week's Total</b>	<b>6812.5</b>	<b>96.6%</b>



Construction and Demolition loads were assessed separately instead of combining them into a collective C&D category. The reasoning was that construction waste is cleaner and more easily separated than demolition waste. Therefore if a material recycling program was instituted it would be easier to source separate and reclaim construction waste. Waste was classified as demolition if the materials were attached to each other, pulverized, or unable to be easily separated.

### Construction Waste

The Construction Waste sector was only 0.2% (16.5 tons) of the total waste. The largest component of the construction waste was wood (89%). Each construction waste load was visually estimated and allocated into the following components:

Const. Components	Weight in Tons	% of Const. Sector
Wood	14.7	89%
Drywall	0	0%
Masonry	0	0%
Metal	0	0%
Plastic	1.5	9%
Cardboard	0	0%
Other	0.3	2%
<b>Total Construction Sector</b>	<b>16.5</b>	<b>100%</b>

### Demolition Waste

The Demolition Waste sector was 1.8% of the total waste. A total of 127.5 tons of demolition waste was delivered to the landfill during the week. The largest component was roofing at 66% of the total demolition waste sector. Each demolition load was visually estimated and allocated into the following components:

Demolition Components	Weight in Tons	% of Demolition Sector
Wood	27.4	21%
Drywall	8.0	6%
Roofing	83.9	66%
Masonry	4.3	3%
Metal	0.8	1%
Carpet	2.8	2 %
Other	0.3	0%
<b>Total Demolition Sector</b>	<b>127.5</b>	<b>100%</b>

### Industrial Waste

The Industrial Waste sector was 1.1% of the total waste. A total of 75.2 tons of industrial waste was delivered to the landfill during the week. The largest industrial component waste was food waste (23%) primarily from a mustard manufacturer in Springfield. Each industrial waste load was visually estimated and allocated into the following components:

<b>Industrial Components</b>	<b>Weight in Tons</b>	<b>% of Industrial Sector</b>
Cardboard	8.5	11%
Paper	1.9	3%
Food	17.5	23%
Metal	0.8	1%
Wood	10.5	14%
Plastic	10.7	14%
Textiles	0.5	1%
Rubber	13.5	18%
Other	11.4	15%
<b>Total Industrial Sector</b>	<b>75.2</b>	<b>100%</b>

#### **Other Waste**

No tree trunks, street sweepings, or sludge was observed during the week.

#### **Special Waste**

The Special Waste sector was 0.3% (20.7 tons) of the total waste. The largest component was contaminated soil at 77%. Bulky items were 23% of the special waste sector. A bulky item was defined as MSW that was too large for normal trash pick-up and therefore not included in the 2006-2007 waste sorts. Each special load was visually estimated and allocated into the following components:

<b>Special Sector Components</b>	<b>Weight in Tons</b>	<b>% of Special Waste</b>
Bulky	4.7	23%
Contaminated Soil	16.0	77%
Asbestos	0	0%
Tritium	0	0%
E-scrap	0	0%
<b>Total Special Sector</b>	<b>20.7</b>	<b>100%</b>

#### **Summary**

Table IV-1 represents estimated waste sectors of the Black Oak Sanitary Landfill from data collected during the week of July 14-18, 2008. The percentages for all components were applied to the tonnage received in 2007 to provide estimated annual tonnage for each material.

**Table IV-1: Observed Waste Sectors at the Black Oak Landfill**

<b>Waste Component</b>	<b>Observed Tons 7/14-7/18</b>	<b>Estimated % of Waste 7/14-7/18</b>	<b>Estimated 2007 Tonnage</b>
<b>MSW Component</b>	<b>6812.5</b>	<b>96.6%</b>	<b>350396</b>
MSW paper	2213.1	32.5%	117838
MSW Glass	358.0	5.3%	19062
MSW Metal	397.5	5.8%	21164
MSW Plastics	1135.2	16.7%	60443
MSW Organics	2078.9	30.5%	110690
MSW Inorganics	272.4	4.0%	14506
MSW Special Waste	125.7	1.8%	6693
<b>Construction Component</b>	<b>16.5</b>	<b>0.2%</b>	<b>850</b>
Wood	14.7	0.2%	756
Drywall	0.0	0.0%	0
Masonry	0.0	0.0%	0
Metal	0.0	0.0%	0
Plastic	1.5	0.0%	79
Cardboard	0.0	0.0%	0
Other	0.3	0.0%	15
<b>Demolition Component</b>	<b>127.5</b>	<b>1.8%</b>	<b>6558</b>
Wood	27.3	0.4%	1406
Drywall	8.0	0.1%	413
Roofing	83.9	1.2%	4316
Masonry	4.3	0.1%	221
Metal	0.8	0.0%	40
Carpet	2.8	0.0%	146
Other	0.3	0.0%	17
<b>Industrial Component</b>	<b>75.2</b>	<b>1.1%</b>	<b>3865</b>
Cardboard	8.5	0.1%	436
Paper	1.9	0.0%	96
Food	17.5	0.2%	898
Metal	0.8	0.0%	43
Wood	10.5	0.1%	539
Plastic	10.7	0.2%	551
Textiles	0.5	0.0%	24
Rubber	13.5	0.2%	692
Other	11.4	0.2%	585
<b>Other Component</b>	<b>0.0</b>	<b>0.0%</b>	<b>0</b>
Sludge	0.0	0.0%	0
Tree Trunks	0.0	0.0%	0
<b>Special Component</b>	<b>20.7</b>	<b>0.3%</b>	<b>1064</b>
Bulky	4.7	0.1%	241
Contaminated Soil	16.0	0.2%	823
Asbestos	0.0	0.0%	0
Tritium	0.0	0.0%	0
E-scrap	0.0	0.0%	0
<b>Total Waste Components</b>	<b>7052.3</b>	<b>100.0%</b>	<b>362734</b>

## City of Columbia Sanitary Landfill

### Introduction

The City of Columbia owns and operates the sanitary landfill located on Peabody Road in Columbia, MO. According to DNR tonnage reports the Columbia Landfill received 175,175 tons of waste in 2007.

Waste disposal was observed at the City of Columbia Landfill between Monday June 2, 2008 and Friday June 6, 2008. Observation took place between 7 AM and 5 PM each day for a total of 50 hours. The weather was unseasonably cool, wet, and windy. During the observation period, 717 vehicles unloaded 3,278 tons of waste into the landfill. The breakdown by day is as follows:

### Data Collection

Day	# of Vehicles	Weight in Tons
Monday 6/2	147	787.3
Tuesday 6/3	153	731.6
Wednesday 6/4	141	593.7
Thursday 6/5	147	559.9
Friday 6/6	129	605.9
<b>Week's Total</b>	<b>717</b>	<b>3278.4</b>

During the observation week the waste composition was visually assessed and categorized into the following major sectors:

Type of waste	Weight in Tons	Percent of the Total
MSW	2098.8	64%
Construction	164.1	5%
Demolition	724.1	22%
Industrial	193.1	6%
Other	10.2	0.3%
Special	88.3	3%
<b>Week's Total</b>	<b>3278.4</b>	<b>100%</b>

### Municipal Solid Waste (MSW)

The Municipal Solid Waste (MSW) sector was 64% of the total waste. The MSW was delivered to the landfill primarily by packer trucks. The City of Columbia operates residential, commercial and roll-off vehicles and most of the MSW was delivered to the landfill via City of Columbia trucks. The daily breakdown was:

Day	Weight in Tons	Percent of the Total
Monday 6/2	525.6	67%
Tuesday 6/3	448.9	61%
Wednesday 6/4	338.1	57%
Thursday 6/5	359.8	64%
Friday 6/6	426.4	70%
<b>Week's Total</b>	<b>2098.8</b>	<b>64%</b>

Construction and Demolition loads were assessed separately instead of combining them into a collective C&D category. The reasoning was that construction waste is cleaner and more easily separated than demolition waste. Therefore if a material recycling program was instituted it would be easier to source separate and reclaim construction waste. Waste was classified as demolition if the materials were attached to each other, pulverized, or unable to be easily separated.

### Construction Waste

The Construction Waste sector was 5.0% (164.1 tons) of the total waste. The largest construction waste components were wood (43%) and drywall (23%). Each construction waste load was visually estimated and allocated into the following components:

Const. Component	Weight in Tons	% of Const. Sector
Wood	71.6	43%
Drywall	37.2	23%
Masonry	18.2	11%
Metal	5.8	4%
Plastic	4.8	3%
Cardboard	18.7	11%
Other	7.8	5%
<b>Total Construction Sector</b>	<b>164.1</b>	<b>100%</b>

### Demolition Waste

The Demolition Waste sector was 22.1% (724.1 tons) of the total waste. The largest components of the demolition waste stream were masonry (inert materials such as concrete block, dirt, bricks, etc.) and wood (28%). Each demolition load was visually estimated and allocated into the following components:

Demolition Components	Weight in Tons	% of Demolition Sector
Wood	199.0	28%
Drywall	111.9	15%
Roofing	138.1	19%
Masonry	211.2	29%
Metal	20.3	3%
Carpet	26.6	4%
Other	17.1	2%
<b>Total Demolition Sector</b>	<b>724.1</b>	<b>100%</b>

### Industrial Waste

The Industrial Waste sector was 5.9% (193.1 tons) of the total waste. The largest industrial waste components were plastic (44%) and Cardboard (21%). Wooden pallets (16%) were also significant. Each industrial waste load was visually estimated and allocated into the following components:

Industrial Components	Weight in Tons	% Industrial Waste
Cardboard	40.2	21%
Paper	5.7	3%
Food	4.0	2%



Metal	5.6	3%
Wood	30.8	16%
Plastic	85.4	44%
Textiles	0.5	0%
Rubber	6.9	4%
Other	14.0	7%
<b>Total Industrial Sector</b>	<b>193.1</b>	<b>100%</b>

#### **Other Waste**

The 'Other' Waste sector was 0.3% (10.2 tons) of the total waste. Street sweepings and tree trunks comprised 100% of this category. The 'Other' waste loads were visually estimated and allocated into the following components:

<b>Other Components</b>	<b>Weight in Tons</b>	<b>% of Other Waste</b>
Sludge	0	0%
Street sweepings and tree trunks	10.2	100%
<b>Total 'Other' Sector</b>	<b>10.2</b>	<b>100%</b>

#### **Special Waste**

The Special Waste sector was 2.7% (88.3%) of the total waste. The largest components of this category were bulky waste (61%) and asbestos (37%). A bulky item was defined as MSW that was too large for normal trash pick-up (furniture, mattresses, large household and commercial objects, etc.) and therefore not included in the 2006-2007 MSW waste sorts. Each special load was visually estimated and allocated into the following components:

<b>Special Components</b>	<b>Weight in Tons</b>	<b>% of Special Waste</b>
Bulky	53.9	61%
Contaminated Soil	0	0%
Asbestos	32.5	37%
Tritium	0	0%
E-scrap	1.9	2%
<b>Total Special Sector</b>	<b>88.3</b>	<b>100%</b>

#### **Summary**

Table IV-2 represents estimated waste sectors of the City of Columbia Sanitary Landfill from data collected during the week of June 2-6, 2008. The MSW component percentages were determined during the study conducted in 2006-07. The components for the remainder were visually estimated as waste was received from 6/2-6/6. The percentages for all components were applied to the tonnage received in 2007 to provide estimated annual tonnage for each material.

**Table IV-2: Observed Waste Sectors at the City of Columbia Landfill**

<b>Waste Component</b>	<b>Observed Tonnage 6/2-6/6</b>	<b>Estimated % of Waste 6/2-6/6</b>	<b>Estimated 2007 Tonnage</b>
<b>MSW Component</b>	<b>2098.7</b>	<b>64.0%</b>	<b>112141</b>
MSW paper	451.8	21.5%	37713
MSW Glass	73.1	3.5%	6100
MSW Metal	81.1	3.9%	6773
MSW Plastics	231.8	11.0%	19344
MSW Organics	424.4	20.2%	35425
MSW Inorganics	55.6	2.7%	4643
MSW Special Waste	25.7	1.2%	2142
<b>Construction Component</b>	<b>164.1</b>	<b>5.0%</b>	<b>8769</b>
Wood	71.6	2.2%	3825
Drywall	37.2	1.1%	1989
Masonry	18.2	0.6%	974
Metal	5.8	0.2%	311
Plastic	4.8	0.1%	259
Cardboard	18.7	0.6%	997
Other	7.8	0.2%	414
<b>Demolition Component</b>	<b>724.1</b>	<b>22.1%</b>	<b>38689</b>
Wood	199.0	6.1%	10631
Drywall	111.9	3.4%	5981
Roofing	138.1	4.2%	7379
Masonry	211.2	6.4%	11283
Metal	20.3	0.6%	1084
Carpet	26.6	0.8%	1419
Other	17.1	0.5%	912
<b>Industrial Component</b>	<b>193.1</b>	<b>5.9%</b>	<b>10315</b>
Cardboard	40.2	1.2%	2146
Paper	5.7	0.2%	303
Food	4.0	0.1%	211
Metal	5.6	0.2%	302
Wood	30.8	0.9%	1647
Plastic	85.4	2.6%	4562
Textiles	0.5	0.0%	27
Rubber	6.9	0.2%	370
Other	14.0	0.4%	749
<b>Other Component</b>	<b>10.2</b>	<b>0.3%</b>	<b>542</b>
Sludge	0.0	0.0%	0
Tree Trunks	10.2	0.3%	542
<b>Special Component</b>	<b>88.3</b>	<b>2.7%</b>	<b>4718</b>
Bulky	53.9	1.6%	2879
Contaminated Soil	0.0	0.0%	0
Asbestos	32.5	1.0%	1737
Tritium	0.0	0.0%	0
E-scrap	1.9	0.1%	102
<b>Total Waste Components</b>	<b>3278.4</b>	<b>100.0%</b>	<b>175175</b>

## City of Springfield Sanitary Landfill

### Introduction

The City of Springfield owns and operates the Springfield sanitary landfill in Greene County, MO. According to DNR tonnage reports the Springfield Landfill received 103,140 tons of waste in 2007.

Waste disposal was observed at the Springfield Landfill between Monday July 7, 2008 and Thursday July 10, 2008. Observation took place between 7 AM and 4 PM each day for a total of 36 hours. Waste was also observed for 9 hours on Friday. However, the computer program that records scale weights malfunctioned and the scale weights were lost during transmission to permanent files and therefore those loads could not be included in the observation data. The mix of waste on Friday seemed consistent with the loads observed Monday through Thursday so the percentages should be similar. During the observation period, 521 vehicles unloaded 1,801.6 tons of waste into the landfill. The breakdown by day is as follows:

### Data Collection

Day	# of Vehicles	Weight in Tons
Monday 7/7	135	377.9
Tuesday 7/8	126	374.9
Wednesday 7/9	129	497.4
Thursday 7/10	131	551.4
Friday 7/11	109(not in total)	N/A
<b>Week's Total</b>	<b>521</b>	<b>1801.6</b>

During the observation week the waste composition was visually assessed and categorized into the following major sectors:

Type of waste	Weight in Tons	Percent of the Total
MSW	900.4	50.0%
Construction	43.9	2.4%
Demolition	483.4	26.9%
Industrial	213.3	11.8%
Other	116.4	6.5%
Special	44.2	2.4%
<b>Week's Total</b>	<b>1801.6</b>	<b>100%</b>

### Municipal Solid Waste (MSW)

The Municipal Solid Waste (MSW) sector was 50.0% of the total waste. The MSW was delivered to the landfill primarily by local packer trucks. No transfer trailers were observed. Much of the residential and commercial MSW in Springfield is collected by Allied and WCA. This waste is transferred to Allied's landfill in Lamar and WCA's landfill in Hartville. The daily breakdown was:

<b>Day</b>	<b>Weight in Tons</b>	<b>Percent of the Total</b>
Monday 7/7	180.2	48%
Tuesday 7/8	191.2	51%
Wednesday 7/9	215.5	43%
Thursday 7/10	313.5	57%
Friday 7/11	N/A	N/A
<b>Week's Total</b>	<b>900.4</b>	<b>50%</b>

Construction and Demolition loads were assessed separately instead of combining them into a collective C&D category. The reasoning was that construction waste is cleaner and more easily separated than demolition waste. Therefore if a material recycling program was instituted it would be easier to source separate and reclaim construction waste. Waste was classified as demolition if the materials were attached to each other, pulverized, or unable to be easily separated.

#### **Construction Waste**

The Construction Waste sector was 2.4% of the total waste. A total of 43.9 tons of construction waste was delivered to the landfill during the four observation days that scale weights were available. Most of this waste (77%) was wood. Each construction waste load was visually estimated and allocated into the following components:

<b>Const. Components</b>	<b>Weight in Tons</b>	<b>% of Const. Sector</b>
Wood	33.7	77%
Drywall	4.4	10%
Masonry	0.1	0%
Metal	0	0%
Plastic	2.3	5.2%
Cardboard	2.2	5.1%
Other	1.2	2.7%
<b>Total Construction Sector</b>	<b>43.9</b>	<b>100%</b>

#### **Demolition Waste**

The Demolition Waste sector was 26.8% of the total waste. A total of 483.4 tons of demolition waste was delivered to the landfill during the four observation days that scale weights were available. Demolition waste was delivered to the landfill primarily in open top roll-off containers, dump trucks, dump trailers, and self haul vehicles. Each demolition load was visually estimated and allocated into the following components:

<b>Demolition Components</b>	<b>Weight in Tons</b>	<b>% of Demolition</b>
Wood	177.3	37%
Drywall	36.9	8%
Roofing	222.2	46%
Masonry	9.3	2%
Metal	5.6	1%
Carpet	31.3	6 %
Other	0.8	0%
<b>Total Demolition Sector</b>	<b>483.4</b>	<b>100%</b>

### Industrial Waste

The Industrial Waste sector was 11.8% of the total waste. A total of 213.3 tons of industrial waste was delivered to the landfill during the four observation days that scale weights were available. Most of the rubber waste was auto belts from the Dayco plant and split auto tires from Don's tire and Ozark hauling. Each industrial waste load was visually estimated and allocated into the following components:

Industrial Components	Weight in Tons	% of Industrial
Cardboard	34.7	17%
Paper	19.6	9%
Food	0	0%
Metal	3.2	2%
Wood	43.2	20%
Plastic	40.0	19%
Textiles	5.2	2%
Rubber	66.5	31%
Other	0.9	0%
<b>Total Industrial Sector</b>	<b>213.3</b>	<b>100%</b>

### Other Waste

The 'Other' Waste sector was 6.5% of the total waste. A total of 116.4 tons of 'Other' waste was delivered to the landfill during the four observation days that scale weights were available. Most of the waste was tree trunks. Waste loads were visually estimated and allocated into the following components:

Other Components	Weight in Tons	% of Other Waste
Sludge	5.2	4%
Tree trunks	111.2	96%
<b>Total 'Other' Sector</b>	<b>116.4</b>	<b>100%</b>

### Special Waste

The Special Waste sector was 2.4% of the total waste. The largest component was bulky items. A bulky item was defined as MSW that was too large for normal trash pick-up and therefore not included in the 2006-2007 waste sorts. Each special load was visually estimated and allocated into the following components:

Special Components	Weight in Tons	% of Special Waste Sector
Bulky	37.7	86%
Contaminated Soil	6.5	14%
Asbestos	0	0%
Tritium	0	0%
E-scrap	0	0%
<b>Total Special Sector</b>	<b>44.2</b>	<b>100%</b>

**Summary**

Table IV-3 represents estimated waste sectors of the Springfield Sanitary Landfill from data collected during the week of July 7-10, 2008. The percentages for all components were applied to the tonnage received in 2007 to provide estimated annual tonnage for each material.



**Table IV-3: Observed Waste Sectors at the City of Springfield Landfill**

<b>Waste Component</b>	<b>Observed Tons 7/7-7/10</b>	<b>Estimated % of Waste 7/7-7/10</b>	<b>Estimated 2007 Tonnage</b>
<b>MSW Component</b>	<b>900.4</b>	<b>50%</b>	<b>51550</b>
MSW paper	151.3	16.8%	17336
MSW Glass	24.5	2.7%	2804
MSW Metal	27.2	3.0%	3114
MSW Plastics	77.6	8.6%	8892
MSW Organics	142.2	15.8%	16285
MSW Inorganics	18.6	2.1%	2134
MSW Special Waste	8.6	1.0%	985
<b>Construction Component</b>	<b>43.9</b>	<b>2.4%</b>	<b>2512</b>
Wood	33.7	1.9%	1928
Drywall	4.4	0.2%	251
Masonry	0.1	0.0%	5
Metal	0.0	0.0%	0
Plastic	2.3	0.1%	131
Cardboard	2.2	0.1%	128
Other	1.2	0.1%	69
<b>Demolition Component</b>	<b>483.4</b>	<b>26.8%</b>	<b>27674</b>
Wood	177.3	9.8%	10149
Drywall	36.9	2.0%	2112
Roofing	222.2	12.3%	12720
Masonry	9.3	0.5%	531
Metal	5.6	0.3%	323
Carpet	31.3	1.7%	1793
Other	0.8	0.0%	45
<b>Industrial Component</b>	<b>213.3</b>	<b>11.8%</b>	<b>12211</b>
Cardboard	34.7	1.9%	1989
Paper	19.6	1.1%	1120
Food	0.0	0.0%	0
Metal	3.2	0.2%	181
Wood	43.2	2.4%	2474
Plastic	40.0	2.2%	2290
Textiles	5.2	0.3%	296
Rubber	66.5	3.7%	3809
Other	0.9	0.1%	53
<b>Other Component</b>	<b>116.4</b>	<b>6.5%</b>	<b>6667</b>
Sludge	5.2	0.3%	298
Tree Trunks	111.2	6.2%	6369
<b>Special Component</b>	<b>44.1</b>	<b>2.4%</b>	<b>2526</b>
Bulky	37.7	2.1%	2161
Contaminated Soil	6.4	0.4%	365
Asbestos	0.0	0.0%	0
Tritium	0.0	0.0%	0
E-scrap	0.0	0.0%	1
<b>Total Waste Components</b>	<b>1801.5</b>	<b>100.0%</b>	<b>103140</b>

## City of St. Joseph Sanitary Landfill

### Introduction

The City of St. Joseph owns and operates the St. Joseph sanitary landfill in Buchanan County, MO. According to DNR tonnage reports the St. Joseph Landfill received 136,964 tons of waste in 2007.

Waste disposal was observed at the St. Joseph Landfill between Monday August 25, 2008 and Friday August 29, 2008. Observation took place between 7 AM and 4 PM each day for a total of 45 hours. During the observation period, 646 vehicles unloaded 3002.4 tons of waste into the landfill. The breakdown by day is as follows:

### Data Collection

Day	# of Vehicles	Weight in Tons
Monday 8/25	140	734.9
Tuesday 8/26	148	576.2
Wednesday 8/27	138	613.8
Thursday 8/28	122	628.7
Friday 8/29	98	448.75
<b>Week's Total</b>	<b>646</b>	<b>3002.4</b>

During the observation week the waste composition was visually assessed and categorized into the following major sectors:

Type of waste	Weight in Tons	Percent of the Total
MSW	1611.9	53.7%
Construction	52.5	1.7%
Demolition	475.1	15.8%
Industrial	653.1	21.8%
Other	24.8	0.8%
Special	185.0	6.2%
<b>Week's Total</b>	<b>3002.4</b>	<b>100%</b>

### Municipal Solid Waste (MSW)

The Municipal Solid Waste (MSW) sector was 53.7% of the total waste. The MSW was delivered to the landfill primarily by local packer trucks and transfer trailers. Transfer trailers originated from Walthena, KS and Cameron, MO. The daily breakdown was:

Day	Weight in Tons	Percent of the Total
Monday 8/25	400.4	54%
Tuesday 8/26	309.9	54%
Wednesday 8/27	298.5	49%
Thursday 8/28	359.7	57%
Friday 8/29	243.4	54%
<b>Week's Total</b>	<b>1611.9</b>	<b>54%</b>

Construction and Demolition loads were assessed separately instead of combining them into a collective C&D category. The reasoning was that construction waste is cleaner and more easily separated than demolition waste. Therefore if a material recycling program was instituted it would be easier to source separate and reclaim construction waste. Waste was classified as demolition if the materials were attached to each other, pulverized, or unable to be easily separated.

### Construction Waste

The Construction Waste sector was 1.7% of the total waste. A total of 52.5 tons of construction waste was delivered to the landfill during the observation period. Most of this waste (54%) was wood. Each construction waste load was visually estimated and allocated into the following components:

Const. Components	Weight in Tons	% of Const. Sector
Wood	28.4	54%
Drywall	4.7	9%
Masonry	0	0%
Metal	7.6	15%
Plastic	6.4	12%
Cardboard	2.7	5%
Other	2.7	25%
<b>Total Construction Sector</b>	<b>52.5</b>	<b>100%</b>

### Demolition Waste

The Demolition Waste sector was 15.8% of the total waste. A total of 475.1 tons of demolition waste was delivered to the landfill during the observation period. The largest components were wood (33%), roofing (30%), and masonry (24%). The metal component came from the destruction of a mobile home that was delivered to the landfill. Each demolition load was visually estimated and allocated into the following components:

Demolition Components	Weight in Tons	% of Demolition
Wood	157.2	33%
Drywall	29.7	7%
Roofing	141.3	30%
Masonry	114.4	24%
Metal	11.6	2%
Carpet	15.9	3%
Other	5.1	1%
<b>Total Demolition Sector</b>	<b>475.1</b>	<b>100%</b>

### Industrial Waste

The Industrial Waste sector was 21.8% of the total waste. A total of 653.1 tons of industrial waste was delivered to the landfill during the observation period. The largest components were cardboard (25%), Food (26%) and wood (22%). The food waste came from Purina (dog food overruns), Nestlé's (cat food), and the Cameron prison food scraps. The wood waste was mostly pallets. Cardboard came from a

wide range of sources. Each industrial waste load was visually estimated and allocated into the following components:

<b>Industrial Components</b>	<b>Weight in Tons</b>	<b>% of Industrial</b>
Cardboard	164.3	25%
Paper	19.7	3%
Food	168.5	26%
Metal	8.4	1%
Wood	143.8	22%
Plastic	46.1	7%
Textiles	20.2	3%
Rubber	5.4	1%
Other	76.7	12%
<b>Total Industrial Sector</b>	<b>653.1</b>	<b>100%</b>

#### **Other Waste**

The 'Other' Waste sector was 0.8% of the total waste. A total of 24.8 tons of 'other' waste was delivered to the landfill during the observation period. Most of the waste (71%) was tree trunks. Waste loads were visually estimated and allocated into the following components:

<b>Other Components</b>	<b>Weight in Tons</b>	<b>% of Other Waste Sector</b>
Sludge	7.3	29%
Tree trunks	17.5	71%
<b>Total 'Other' Sector</b>	<b>24.8</b>	<b>100%</b>

#### **Special Waste**

The Special Waste sector was 6.2% of the total waste. The largest component (68%) was contaminated soil (petroleum saturated soil and clay used in the filtering of soybean oil). Bulky items represented 30% of the special waste sector. A bulky item was defined as MSW that was too large for normal trash pick-up and therefore not included in the 2006-2007 MSW waste sorts. Each special load was visually estimated and allocated into the following components:

<b>Special Components</b>	<b>Weight in Tons</b>	<b>% of Special Waste Sector</b>
Bulky	54.7	30%
Contaminated Soil	126.1	68%
Asbestos	4.2	2%
Tritium	0	0%
E-scrap	0	0%
<b>Total Special Sector</b>	<b>185.0</b>	<b>100%</b>

#### **Summary**

Table IV-4 represents estimated waste sectors of the St. Joseph Sanitary Landfill from data collected during the week of August 25-29, 2008. The percentages for all components were applied to the tonnage received in 2007 to provide estimated annual tonnage for each material.

**Table IV-4: Observed Waste Sectors at the City of St. Joseph Landfill**

<b>Waste Component</b>	<b>Observed Tonnage 8/25-8/29</b>	<b>Estimated % of Waste 8/25-8/29</b>	<b>Estimated 2007 Tonnage</b>
<b>MSW Component</b>	<b>1611.9</b>	<b>53.7%</b>	<b>73532</b>
MSW paper	291.0	18.1%	24729
MSW Glass	47.1	2.9%	4000
MSW Metal	52.3	3.2%	4441
MSW Plastics	149.3	9.3%	12684
MSW Organics	273.4	17.0%	23229
MSW Inorganics	35.8	2.2%	3044
MSW Special Waste	16.5	1.0%	1404
<b>Construction Component</b>	<b>52.5</b>	<b>1.7%</b>	<b>2394</b>
Wood	28.4	0.9%	1295
Drywall	4.7	0.2%	213
Masonry	0.0	0.0%	0
Metal	7.6	0.3%	349
Plastic	6.4	0.2%	291
Cardboard	2.7	0.1%	122
Other	2.7	0.1%	124
<b>Demolition Component</b>	<b>475.1</b>	<b>15.8%</b>	<b>21674</b>
Wood	157.2	5.2%	7170
Drywall	29.7	1.0%	1356
Roofing	141.3	4.7%	6446
Masonry	114.4	3.8%	5218
Metal	11.6	0.4%	529
Carpet	15.9	0.5%	724
Other	5.1	0.2%	231
<b>Industrial Component</b>	<b>653.1</b>	<b>21.8%</b>	<b>29793</b>
Cardboard	164.3	5.5%	7496
Paper	19.7	0.7%	899
Food	168.5	5.6%	7686
Metal	8.4	0.3%	382
Wood	143.8	4.8%	6561
Plastic	46.1	1.5%	2104
Textiles	20.2	0.7%	919
Rubber	5.4	0.2%	245
Other	76.8	2.6%	3501
<b>Other Component</b>	<b>24.8</b>	<b>0.8%</b>	<b>1131</b>
Sludge	7.3	0.2%	333
Tree Trunks	17.5	0.6%	799
<b>Special Component</b>	<b>185.0</b>	<b>6.2%</b>	<b>8439</b>
Bulky	54.7	1.8%	2494
Contaminated Soil	126.1	4.2%	5754
Asbestos	4.2	0.1%	189
Tritium	0.0	0.0%	0
E-scrap	0.0	0.0%	2
<b>Total Waste Components</b>	<b>3002.4</b>	<b>100.0%</b>	<b>136964</b>

## **Courtney Ridge Sanitary Landfill**

### **Kansas City Metropolitan Area**

#### **Introduction**

Allied Waste Industries Inc. owns and operates the Courtney Ridge sanitary landfill in the Kansas City Missouri metropolitan area. According to DNR tonnage reports the Courtney Ridge Landfill received 520,394 tons of waste in 2007.

Waste disposal was observed at the Courtney Ridge Landfill between Monday August 18, 2008 and Friday August 22, 2008. Observation took place between 7 AM and 4:30 PM each day for a total of 47 hours. The weather was seasonably mild with no appreciable rain. During the observation period, 1152 vehicles unloaded 10,627 tons of waste into the landfill. The breakdown by day is as follows:

#### **Data Collection**

<b>Day</b>	<b># of Vehicles</b>	<b>Weight in Tons</b>
Monday 8/18	254	2565.4
Tuesday 8/19	238	2147.5
Wednesday 8/20	207	1669.8
Thursday 8/21	222	2288.0
Friday 8/22	231	1956.6
<b>Week's Total</b>	<b>1152</b>	<b>10627.3</b>

During the observation week the waste composition was visually assessed and categorized into the following major sectors:

<b>Type of waste</b>	<b>Weight in Tons</b>	<b>Percent of the Total</b>
MSW	3530.7	33.2%
Construction	135.8	1.3%
Demolition	1165.2	11.0%
Industrial	2203.4	20.7%
Other	256.3	2.4%
Special	3336.0	31.4%
<b>Week's Total</b>	<b>10627.3</b>	<b>100%</b>

#### **Municipal Solid Waste (MSW)**

The Municipal Solid Waste (MSW) sector was 33% of the total waste. The MSW was delivered to the landfill primarily by packer trucks. The daily breakdown was:

<b>Day</b>	<b>Weight in Tons</b>	<b>Percent of the Total</b>
Monday 8/18	814.7	32%
Tuesday 8/19	686.2	32%
Wednesday 8/20	734.7	44%
Thursday 8/21	646.7	28%
Friday 8/22	648.5	33%
<b>Week's Total</b>	<b>3530.7</b>	<b>33.2%</b>

Construction and Demolition loads were assessed separately instead of combining them into a collective C&D category. The reasoning was that construction waste is



cleaner and more easily separated than demolition waste. Therefore if a material recycling program was instituted it would be easier to source separate and reclaim construction waste. Waste was classified as demolition if the materials were attached to each other, pulverized, or unable to be easily separated.

### Construction Waste

The Construction Waste sector was 1.3% of the total waste. Over half of the construction waste was wood (69.1 tons). Masonry consisted of inert materials (sand, dirt, brick, concrete etc.) The 'other' component consisted of insulation, paint, windows, etc. Each construction waste load was visually estimated and allocated into the following components:

Const. Components	Weight in Tons	% of Const. Sector
Wood	69.1	51%
Drywall	15.7	12%
Masonry	22.6	16%
Metal	0.4	0%
Plastic	10.8	8%
Cardboard	2.8	2%
Other	14.5	11%
<b>Total Construction Sector</b>	<b>135.8</b>	<b>100%</b>

### Demolition Waste

The Demolition Waste sector was 11.0% of the total waste. Over half of the demolition waste was wood (654.9 tons) and consisted of normal wood from demolition activities and railroad ties from Frontier Industries. Masonry consisted of rubble (dirt, rock, concrete etc.) from demolition activities. Each demolition load was visually estimated and allocated into the following components:

Demolition Components	Weight in Tons	% of Demolition
Wood	654.9	56%
Drywall	70.4	6%
Roofing	103.9	9%
Masonry	247.1	1%
Metal	10.6	1%
Carpet	71.2	6%
Other	7.0	1%
<b>Total Demolition Sector</b>	<b>1165.2</b>	<b>100%</b>

### Industrial Waste

The Industrial Waste sector was 20.7% of the total waste. The largest percentage of industrial waste was auto fluff from Midwest Scrap and this was recorded in the 'industrial other' component category. There was an unusually large amount (412 tons) of cardboard mixed with industrial loads. The wood component (240 tons) consisted mostly of wooden pallets. Each industrial waste load was visually estimated and allocated into the following components:

<b>Industrial Components</b>	<b>Weight in Tons</b>	<b>% of Industrial</b>
Cardboard	412.6	19%
Paper	29.5	1%
Food	38.7	2%
Metal	14.8	1%
Wood	239.4	11%
Plastic	134.4	6%
Textiles	16.9	1%
Rubber	5.8	0%
Other	1311.2	59%
<b>Total Industrial Sector</b>	<b>2203.4</b>	<b>100%</b>

#### **Other Waste**

The 'Other' Waste sector was 2.4% of the total waste. Half of the waste was sewer sludge from wastewater facilities. Large tree limbs, tree trunks, and street sweepings accounted for the other half of the category 'Other' waste loads were visually estimated and allocated into the following components:

<b>Other Components</b>	<b>Weight in Tons</b>	<b>% of Other Waste Sector</b>
Sludge	129.7	51%
Street sweepings and tree trunks	126.6	49%
<b>Total 'Other' Sector</b>	<b>256.3</b>	<b>100%</b>

#### **Special Waste**

The Special Waste sector was 31.4% of the total waste. The largest component was contaminated soil (2,917 tons) from Missouri Gas and Energy and BNSF Railway. Asbestos (187 tons) was delivered to the landfill on 8/18 and 8/19. Bulky items accounted for the remaining seven percent. A bulky item was defined as MSW that was too large for normal trash pick-up and therefore not included in the 2006-2007 MSW waste sorts. Some e-waste (3 tons) was also observed. Each special load was visually estimated and allocated into the following components:

<b>Special Components</b>	<b>Weight in Tons</b>	<b>% of Special Waste Sector</b>
Bulky	228.3	7%
Contaminated Soil	2917.5	87%
Asbestos	187.1	6%
Tritium	0	0%
E-scrap	3.1	0%
<b>Total Special Sector</b>	<b>3336.0</b>	<b>100%</b>

#### **Summary**

Table IV-5 represents estimated waste sectors of the Courtney Ridge Sanitary Landfill from data collected during the week of August 18 through August 22, 2008. The MSW component percentages were determined during the study conducted in 2006-07. The components for the remainder were visually estimated as waste was received from 8/18-8/22. The percentages for all components were applied to the tonnage received in 2007 to provide estimated annual tonnage for each material.

**Table IV-5: Observed Waste Sectors at the Courtney Ridge Landfill**

<b>Waste Component</b>	<b>Observed Tonnage 8/18-8/22</b>	<b>Estimated % of Waste 8/18-8/22</b>	<b>Estimated 2007 Tonnage</b>
<b>MSW Component</b>	<b>3530.7</b>	<b>33.2%</b>	<b>172891</b>
MSW paper	394.5	11.2%	58143
MSW Glass	63.8	1.8%	9405
MSW Metal	70.9	2.0%	10443
MSW Plastics	202.3	5.7%	29824
MSW Organics	370.6	10.5%	54616
MSW Inorganics	48.6	1.4%	7158
MSW Special Waste	22.4	0.6%	3302
<b>Construction Component</b>	<b>135.8</b>	<b>1.3%</b>	<b>6649</b>
Wood	69.1	0.7%	3384
Drywall	15.7	0.1%	767
Masonry	22.6	0.2%	1107
Metal	0.4	0.0%	17
Plastic	10.8	0.1%	529
Cardboard	2.8	0.0%	136
Other	14.5	0.1%	709
<b>Demolition Component</b>	<b>1165.2</b>	<b>11.0%</b>	<b>57056</b>
Wood	654.9	6.2%	32069
Drywall	70.4	0.7%	3449
Roofing	103.9	1.0%	5089
Masonry	247.1	2.3%	12101
Metal	10.6	0.1%	521
Carpet	71.2	0.7%	3485
Other	7.0	0.1%	341
<b>Industrial Component</b>	<b>2203.4</b>	<b>20.7%</b>	<b>107894</b>
Cardboard	412.6	3.9%	20202
Paper	29.5	0.3%	1445
Food	38.7	0.4%	1893
Metal	14.8	0.1%	725
Wood	239.4	2.3%	11725
Plastic	134.4	1.3%	6580
Textiles	16.9	0.2%	830
Rubber	5.8	0.1%	285
Other	1311.3	12.3%	64210
<b>Other Component</b>	<b>256.3</b>	<b>2.4%</b>	<b>12550</b>
Sludge	129.7	1.2%	6349
Tree Trunks	126.6	1.2%	6201
<b>Special Component</b>	<b>3336.0</b>	<b>31.4%</b>	<b>163354</b>
Bulky	228.3	2.1%	11178
Contaminated Soil	2917.5	27.5%	142864
Asbestos	187.1	1.8%	9161
Tritium	0.0	0.0%	0
E-scrap	3.1	0.0%	151
<b>Total Waste Components</b>	<b>10627.3</b>	<b>100.0%</b>	<b>520394</b>

## The Fred Weber Sanitary Landfill

### St. Louis Metropolitan Area

#### Introduction

Fred Weber Inc. owns and operates the Fred Weber Sanitary Landfill in St. Louis County, MO. According to DNR tonnage reports the Fred Weber Landfill received 995,443 tons of waste in 2007.

Waste disposal was observed at the Fred Weber Landfill between Monday September 8, 2008 and Friday September 12, 2008. Observation took place between 7 AM and 3:00 PM each day for a total of 40 hours. The weather was seasonal with some rain on 9/12. During the observation period, 1,305 vehicles unloaded 12,017 tons of waste into the landfill. The breakdown by day is as follows:

#### Data Collection

Day	# of Vehicles	Weight in Tons
Monday 9/8	263	2414.6
Tuesday 9/9	268	2609.3
Wednesday 9/10	277	2626.0
Thursday 9/11	268	2315.1
Friday 9/12	229	2052.4
<b>Week's Total</b>	<b>1305</b>	<b>12017.4</b>

During the observation week the waste composition was visually assessed and categorized into the following major sectors:

Type of waste	Weight in Tons	Percent of the Total
MSW	5622.2	46.8%
Construction	373.0	3.1%
Demolition	1970.9	16.4%
Industrial	1026.9	8.6%
Other	374.7	3.1%
Special	2649.7	22.0%
<b>Week's Total</b>	<b>12017.4</b>	<b>100%</b>

#### Municipal Solid Waste (MSW)

The Municipal Solid Waste (MSW) sector was 46.8% of the total waste. The MSW was delivered to the landfill primarily by packer trucks and transfer trailers. Transfer trailers came from transfer stations in University City, Foristell, Valley Park, and O'Fallon. The daily breakdown was:

Day	Weight in Tons	Percent of the Total
Monday 9/8	1315.8	54%
Tuesday 9/9	1156.4	44%
Wednesday 9/10	879.6	33%
Thursday 9/11	1079.1	47%
Friday 9/12	1191.3	58%
<b>Week's Total</b>	<b>5622.2</b>	<b>46.8%</b>

Construction and Demolition loads were assessed separately instead of combining them into a collective C&D category. The reasoning was that construction waste is cleaner and more easily separated than demolition waste. Therefore if a material recycling program was instituted it would be easier to source separate and reclaim construction waste. Waste was classified as demolition if the materials were attached to each other, pulverized, or unable to be easily separated.

### Construction Waste

The Construction Waste sector was 3.1% of the total waste. Construction waste was delivered to the landfill in open top roll-off containers or dump trucks by private service providers or construction companies. Each construction waste load was visually estimated and allocated into the following components:

Const. Components	Weight in Tons	% of Const. Sector
Wood	177.2	48%
Drywall	71.7	19%
Masonry	28.7	8%
Metal	4.9	1%
Plastic	20.2	5%
Cardboard	50.1	13%
Other	20.2	6%
<b>Total Construction Sector</b>	<b>373.0</b>	<b>100%</b>

### Demolition Waste

The Demolition Waste sector was 16.4% of the total waste. The largest component was wood at 1,146 tons (58%). Each demolition load was visually estimated and allocated into the following components:

Demolition Components	Weight in Tons	% of Demolition
Wood	1146.2	58%
Drywall	205.0	10%
Roofing	166.6	8%
Masonry	316.2	16%
Metal	12.8	1%
Carpet	92.8	5%
Other	31.3	2%
<b>Total Demolition Sector</b>	<b>1970.9</b>	<b>100%</b>

### Industrial Waste

The Industrial Waste sector was 8.6% of the total waste. The largest industrial component was foundry sand from Metal Tech (448.6 tons). Industrial cardboard (216 tons) and wood (168.9 tons) were the other major components. Each industrial waste load was visually estimated and allocated into the following components:

<b>Industrial Components</b>	<b>Weight in Tons</b>	<b>% of Industrial</b>
Cardboard	216.0	21%
Paper	22.3	2%
Food	2.3	0%
Metal	2.9	0%
Wood	168.8	17%
Plastic	95.5	9%
Textiles	17.5	2%
Rubber	53.0	5%
Other (foundry sand)	448.6	44%
<b>Total Industrial Sector</b>	<b>1026.9</b>	<b>100%</b>

#### **Other Waste**

The 'Other' waste sector was 3.1% of the total waste. The sludge sector was sewer sludge from the Metropolitan Sewer District (MSD). 'Other' waste loads were visually estimated and allocated into the following components:

<b>Other Waste Components</b>	<b>Weight in Tons</b>	<b>% of Other Waste</b>
Sludge	200.2	53%
Tree trunks	174.6	47%
<b>Total 'Other' Sector</b>	<b>374.8</b>	<b>100%</b>

#### **Special Waste**

The Special Waste sector was 22% of the total waste. The largest sector (2004 tons) was non-friable asbestos which came from a demolition project in Wellston. A bulky item was defined as MSW that was too large for normal trash pick-up and therefore not included in the 2006-2007 MSW waste sorts. Bulky waste is normally furniture, mattresses, and large household items. Each special load was visually estimated and allocated into the following components:

<b>Special Components</b>	<b>Weight in Tons</b>	<b>% of Special Waste</b>
Bulky	301.5	11%
Contaminated Soil	343.5	13%
Asbestos	2004.4	76%
Tritium	0	0%
E-scrap	0.3	0%
<b>Total Special Sector</b>	<b>2649.7</b>	<b>100%</b>

#### **Summary**

Table IV-6 represents estimated waste sectors of the Fred Weber Sanitary Landfill from data collected during the week of September 8-12, 2008. The MSW component percentages were determined during the study conducted in 2006-07. The components for the remainder were visually estimated as waste was received from 9/8-9/12. The percentages for all components were applied to the tonnage received in 2007 to provide estimated annual tonnage for each material.



**Table IV-6: Observed Waste Sectors at the Fred Weber Landfill**

<b>Waste Component</b>	<b>Observed Tonnage 9/8-9/12</b>	<b>Estimated % of Waste 9/8-9/12</b>	<b>Estimated 2007 Tonnage</b>
<b>MSW Component</b>	<b>5622.2</b>	<b>46.8%</b>	<b>465706</b>
MSW paper	884.6	15.7%	156617
MSW Glass	143.1	2.5%	25334
MSW Metal	158.9	2.8%	28129
MSW Plastics	453.7	8.1%	80334
MSW Organics	830.9	14.8%	147117
MSW Inorganics	108.9	1.9%	19280
MSW Special Waste	50.2	0.9%	8895
<b>Construction Component</b>	<b>373.0</b>	<b>3.1%</b>	<b>30894</b>
Wood	177.1	1.5%	14672
Drywall	71.7	0.6%	5941
Masonry	28.7	0.2%	2379
Metal	4.9	0.0%	406
Plastic	20.2	0.2%	1676
Cardboard	50.1	0.4%	4150
Other	20.2	0.2%	1669
<b>Demolition Component</b>	<b>1970.9</b>	<b>16.4%</b>	<b>163260</b>
Wood	1146.3	9.5%	94951
Drywall	205.0	1.7%	16979
Roofing	166.6	1.4%	13796
Masonry	316.2	2.6%	26196
Metal	12.8	0.1%	1063
Carpet	92.8	0.8%	7687
Other	31.3	0.3%	2589
<b>Industrial Component</b>	<b>1026.9</b>	<b>8.5%</b>	<b>85061</b>
Cardboard	216.0	1.8%	17891
Paper	22.3	0.2%	1845
Food	2.3	0.0%	190
Metal	2.9	0.0%	238
Wood	168.9	1.4%	13989
Plastic	95.6	0.8%	7917
Textiles	17.5	0.1%	1448
Rubber	53.0	0.4%	4389
Other	448.6	3.7%	37156
<b>Other Component</b>	<b>374.8</b>	<b>3.1%</b>	<b>31042</b>
Sludge	200.1	1.7%	16578
Tree Trunks	174.6	1.5%	14464
<b>Special Component</b>	<b>2649.7</b>	<b>22.0%</b>	<b>219480</b>
Bulky	301.5	2.5%	24977
Contaminated Soil	343.4	2.9%	28448
Asbestos	2004.4	16.7%	166029
Tritium	0.0	0.0%	0
E-scrap	0.3	0.0%	25
<b>Total Waste Components</b>	<b>12017.4</b>	<b>100.0%</b>	<b>995443</b>

## **IESI Timber Ridge Sanitary Landfill**

### **Washington County, Missouri**

#### **Introduction**

IESI MO. Corp. owns and operates the Timber Ridge sanitary landfill in Washington County, MO. According to DNR tonnage reports the Timber Ridge Landfill received 172,796 tons of waste in 2007.

Waste disposal was observed at the Timber Ridge Landfill between Monday June 16, 2008 and Friday June 20, 2008. Observation took place between 6:30 AM and 5 PM each day for a total of 52 hours. The weather was sunny and dry. During the observation period, 341 vehicles unloaded 3,757 tons of waste into the landfill. The breakdown by day is as follows:

#### **Data Collection**

<b>Day</b>	<b># of Vehicles</b>	<b>Weight in Tons</b>
Monday 6/16	62	716.4
Tuesday 6/17	61	665.2
Wednesday 6/18	68	712.8
Thursday 6/19	69	720.6
Friday 6/20	81	942.1
<b>Week's Total</b>	<b>341</b>	<b>3757.1</b>

During the observation week the waste composition was visually assessed and categorized into the following major sectors:

<b>Type of waste</b>	<b>Weight in Tons</b>	<b>Percent of the Total</b>
MSW	2958.3	78.7%
Construction	26.7	0.7%
Demolition	300.2	8.0%
Industrial	363.7	9.7%
Other	9.4	0.3%
Special	98.7	2.6%
<b>Week's Total</b>	<b>3757.1</b>	<b>100%</b>

#### **Municipal Solid Waste (MSW)**

The Municipal Solid Waste (MSW) sector was 78.7% of the total waste. The MSW was delivered to the landfill primarily by packer trucks and transfer trailers. Transfer trailers came from St. Francis County Environmental Corp. and Meramec Valley Processing facility. The daily breakdown was:

<b>Day</b>	<b>Weight in Tons</b>	<b>Percent of the Total</b>
Monday 6/16	581.8	81%
Tuesday 6/17	560.3	84%
Wednesday 6/18	642.9	90%
Thursday 6/19	571.9	79%
Friday 6/20	601.4	64%
<b>Week's Total</b>	<b>2958.3</b>	<b>79%</b>

Construction and Demolition loads were assessed separately instead of combining them into a collective C&D category. The reasoning was that construction waste is cleaner and more easily separated than demolition waste. Therefore if a material recycling program was instituted it would be easier to source separate and reclaim construction waste. Waste was classified as demolition if the materials were attached to each other, pulverized, or unable to be easily separated.

### Construction Waste

The Construction Waste sector was 0.7% of the total waste. This was a much lower percentage than was being observed at other sites. The relatively small amount of construction waste was delivered to the landfill by private construction companies. Each construction waste load was visually estimated and allocated into the following components:

Const. Components	Weight in Tons	% of Const. Sector
Wood	5.5	21%
Drywall	3.0	11%
Masonry	0	0%
Metal	6.9	26%
Plastic	4.6	17%
Cardboard	4.4	16%
Other	2.3	9%
<b>Total Construction Sector</b>	<b>26.7</b>	<b>100%</b>

### Demolition Waste

The Demolition Waste sector was 8.0% of the total waste. Demolition waste was delivered to the landfill primarily in open top roll-off containers, dump trucks, dump trailers, and self haul vehicles. Each demolition load was visually estimated and allocated into the following components:

Components	Weight in Tons	% of Demolition
Wood	124.5	42%
Drywall	58.6	19%
Roofing	47.1	16%
Masonry	5.3	2%
Metal	19.0	6%
Carpet	26.9	9%
Other	18.8	6%
<b>Total Demolition Sector</b>	<b>300.2</b>	<b>100%</b>

### Industrial Waste

The Industrial Waste sector was 9.7% of the total waste. A large amount (over 200 tons) of 'auto fluff' was delivered to the landfill on 6/20. This was classified as "Industrial Other". It consisted of all non metallic materials removed from cars during the crushing process. Other industrial waste was delivered to the landfill in roll-off containers. Each industrial waste load was visually estimated and allocated into the following components:

<b>Industrial Components</b>	<b>Weight in Tons</b>	<b>% of Industrial</b>
Cardboard	36.2	10%
Paper	1.4	0%
Food	19.2	5%
Metal	10.0	3%
Wood	51.3	14%
Plastic	20.3	6%
Textiles	0	0%
Rubber	2.5	1%
Other	222.7	61%
<b>Total Industrial Sector</b>	<b>363.7</b>	<b>100%</b>

#### **Other Waste**

The 'Other' Waste sector was 0.3% of the total waste. No sludge was recorded. Tree trunks composed 100% of this category. Waste loads were visually estimated and allocated into the following components:

<b>Other Components</b>	<b>Weight in Tons</b>	<b>% of Other Waste</b>
Sludge	0	0%
Street sweepings and tree trunks	9.4	100%
<b>Total 'Other' Sector</b>	<b>9.4</b>	<b>100%</b>

#### **Special Waste**

The Special Waste sector was 2.6% of the total waste. The Special waste components were bulky items and contaminated soil. A bulky item was defined as MSW that was too large for normal trash pick-up and therefore not included in the 2006-2007 MSW waste sorts. Contaminated soil contained petroleum products. Each special load was visually estimated and allocated into the following components:

<b>Special Components</b>	<b>Weight in Tons</b>	<b>% of Special Waste</b>
Bulky	22.5	22%
Contaminated Soil	75.8	77%
Asbestos	0	0%
Tritium	0	0%
E-scrap	0.5	1%
<b>Total Special Sector</b>	<b>98.7</b>	<b>100%</b>

#### **Summary**

Table IV-7 represents estimated waste sectors of the Timber Ridge Sanitary Landfill from data collected during the week of June 16-20, 2008. The MSW component percentages were determined during the study conducted in 2006-07. The components for the remainder were visually estimated as waste was received from 6/16-6/20. The percentages for all components were applied to the tonnage received in 2007 to provide estimated annual tonnage for each material.

**Table IV-7: Observed Waste Sectors at the Timber Ridge Landfill**

<b>Waste Component</b>	<b>Observed Tonnage 6/16-6/20</b>	<b>Estimated % of Waste 6/16-6/20</b>	<b>Estimated 2007 Tonnage</b>
<b>MSW Component</b>	<b>2958</b>	<b>78.7%</b>	<b>136058</b>
MSW paper	1096	26.5%	45756
MSW Glass	177	4.3%	7402
MSW Metal	197	4.8%	8218
MSW Plastics	562	13.6%	23470
MSW Organics	1030	24.9%	42981
MSW Inorganics	135	3.3%	5633
MSW Special Waste	62	1.5%	2599
<b>Construction Component</b>	<b>26.7</b>	<b>0.7%</b>	<b>1227</b>
Wood	5.5	0.1%	254
Drywall	3.0	0.1%	136
Masonry	0.0	0.0%	0
Metal	6.9	0.2%	318
Plastic	4.6	0.1%	211
Cardboard	4.4	0.1%	201
Other	2.3	0.1%	106
<b>Demolition Component</b>	<b>300.2</b>	<b>8.0%</b>	<b>13808</b>
Wood	124.5	3.3%	5724
Drywall	58.6	1.6%	2694
Roofing	47.1	1.3%	2166
Masonry	5.3	0.1%	246
Metal	19.0	0.5%	873
Carpet	26.9	0.7%	1239
Other	18.8	0.5%	866
<b>Industrial Component</b>	<b>363.7</b>	<b>9.7%</b>	<b>16729</b>
Cardboard	36.2	1.0%	1665
Paper	1.4	0.0%	64
Food	19.2	0.5%	883
Metal	10.0	0.3%	461
Wood	51.3	1.4%	2361
Plastic	20.3	0.5%	935
Textiles	0.0	0.0%	0
Rubber	2.5	0.1%	116
Other	222.7	5.9%	10244
<b>Other Component</b>	<b>9.4</b>	<b>0.3%</b>	<b>433</b>
Sludge	0.0	0.0%	0
Tree Trunks	9.4	0.3%	433
<b>Special Component</b>	<b>98.7</b>	<b>2.6%</b>	<b>4541</b>
Bulky	22.5	0.6%	1035
Contaminated Soil	75.8	2.0%	3485
Asbestos	0.0	0.0%	0
Tritium	0.0	0.0%	0
E-scrap	0.5	0.0%	22
<b>Total Waste Components</b>	<b>3757.1</b>	<b>100.0%</b>	<b>172796</b>

## Jefferson City Sanitary Landfill

### Cole County, Missouri

#### Introduction

Allied Waste Industries Inc. owns and operates the Jefferson City Sanitary Landfill in Cole County, MO. According to DNR tonnage reports the Jefferson City Landfill received 200,218 tons of waste in 2007.

Waste disposal was observed at the Jefferson City Landfill between Monday September 22, 2008 and Friday September 26, 2008. Observation took place between 7 AM and 4:30 PM each day for a total of 47.5 hours. The weather was seasonal with no rain. During the observation period, 460 vehicles unloaded 3,460 tons of waste into the landfill. The breakdown by day is as follows:

#### Data Collection

Day	# of Vehicles	Weight in Tons
Monday 9/22	110	938.2
Tuesday 9/23	115	902.1
Wednesday 9/24	79	535.8
Thursday 9/25	69	490.9
Friday 9/26	87	593.0
<b>Week's Total</b>	<b>460</b>	<b>3460.0</b>

During the observation week the waste composition was visually assessed and categorized into the following major sectors:

Type of waste	Weight in Tons	Percent of the Total
MSW	1817.7	52.5%
Construction	24.8	0.7%
Demolition	669.0	19.3%
Industrial	288.2	8.3%
Other	2.0	0.1%
Special	658.3	19.1%
<b>Week's Total</b>	<b>3460.0</b>	<b>100%</b>

#### Municipal Solid Waste (MSW)

The Municipal Solid Waste (MSW) sector was 52.5% of the total waste. The MSW was delivered to the landfill primarily by packer trucks and transfer trailers. Transfer trailers came from Osage Beach. The daily breakdown was:

Day	Weight in Tons	Percent of the Total
Monday 9/22	381.5	41%
Tuesday 9/23	432.3	48%
Wednesday 9/24	336.2	63%
Thursday 9/25	315.9	64%
Friday 9/26	351.8	59%
<b>Week's Total</b>	<b>1817.7</b>	<b>52.5%</b>

Construction and Demolition loads were assessed separately instead of combining them into a collective C&D category. The reasoning was that construction waste is cleaner and more easily separated than demolition waste. Therefore if a material recycling program was instituted it would be easier to source separate and reclaim construction waste. Waste was classified as demolition if the materials were attached to each other, pulverized, or unable to be easily separated.

#### **Construction Waste**

The Construction Waste sector was 0.7% of the total waste. The largest components were wood (53%) and drywall (24%). Each construction waste load was visually estimated and allocated into the following components:

<b>Const. Components</b>	<b>Weight in Tons</b>	<b>% of Const. Sector</b>
Wood	13.1	53%
Drywall	6.0	24%
Masonry	0	0%
Metal	2.5	10%
Plastic	1.2	5%
Cardboard	0.9	4%
Other	1.0	4%
<b>Total Construction Sector</b>	<b>24.7</b>	<b>100%</b>

#### **Demolition Waste**

The Demolition Waste sector was 19.3% of the total waste. The largest components were wood (55%) and roofing (41%). Each demolition load was visually estimated and allocated into the following components:

<b>Demolition Components</b>	<b>Weight in Tons</b>	<b>% of Demolition</b>
Wood	233.7	35%
Drywall	63.3	10%
Roofing	275.7	41%
Masonry	42.9	6%
Metal	3.1	1%
Carpet	48.1	7%
Other	2.2	0%
<b>Total Demolition Sector</b>	<b>669.0</b>	<b>100%</b>

#### **Industrial Waste**

The Industrial Waste sector was 8.3% of the total waste. The largest industrial component was cardboard (40%) and wood pallets (27%). Each industrial waste load was visually estimated and allocated into the following components:



<b>Industrial Components</b>	<b>Weight in Tons</b>	<b>% of Industrial</b>
Cardboard	115.1	40%
Paper	7.4	3%
Food	3.8	1%
Metal	2.8	1%
Wood	76.9	27%
Plastic	17.1	6%
Textiles	2.9	1%
Rubber	20.2	7%
Other	42.0	14%
<b>Total Industrial Sector</b>	<b>288.2</b>	<b>100%</b>

#### **Other Waste**

The 'Other' waste sector was 0.1% of the total waste. The sludge sector was from the Jefferson City wastewater plant. 'Other' waste loads were visually estimated and allocated into the following components:

<b>Other Components</b>	<b>Weight in Tons</b>	<b>% of Other Waste</b>
Sludge	2.0	100%
Street sweepings and tree trunks	0.0	0%
<b>Total 'Other' Sector</b>	<b>2.0</b>	<b>100%</b>

#### **Special Waste**

The Special Waste sector was 19.0% of the total waste. The largest component was contaminated soil (91%) from a private residence in California, MO that was high in lead. A bulky item was defined as MSW that was too large for normal trash pick-up and therefore not included in the 2006-2007 MSW waste sorts. Each special load was visually estimated and allocated into the following components:

<b>Special Components</b>	<b>Weight in Tons</b>	<b>% of Special Waste</b>
Bulky	41.5	7%
Contaminated Soil	600.5	91%
Asbestos	16.1	2%
Tritium	0	0%
E-scrap	0.2	0%
<b>Total Special Sector</b>	<b>658.3</b>	<b>100%</b>

#### **Summary**

Table IV-8 represents estimated waste sectors of the Jefferson City Sanitary Landfill from data collected during the week of September 22-26, 2008. The MSW component percentages were determined during the study conducted in 2006-07. The components for the remainder were visually estimated as waste was received from 9/22-9/26. The percentages for all components were applied to the tonnage received in 2007 to provide estimated annual tonnage for each material.

**Table IV-8: Observed Waste Sectors at the Jefferson City Landfill**

<b>Waste Component</b>	<b>Observed Tonnage 9/22-9/26</b>	<b>Estimated % of Waste 9/22-9/26</b>	<b>Estimated 2007 Tonnage</b>
<b>MSW Component</b>	<b>1817.7</b>	<b>52.5%</b>	<b>105186</b>
MSW paper	321.1	17.7%	18584
MSW Glass	51.9	2.9%	3006
MSW Metal	57.7	3.2%	3338
MSW Plastics	164.7	9.1%	9532
MSW Organics	301.7	16.6%	17457
MSW Inorganics	39.5	2.2%	2288
MSW Special Waste	18.2	1.0%	1055
<b>Construction Component</b>	<b>24.7</b>	<b>0.7%</b>	<b>1432</b>
Wood	13.1	0.4%	756
Drywall	6.0	0.2%	350
Masonry	0.0	0.0%	3
Metal	2.5	0.1%	147
Plastic	1.2	0.0%	67
Cardboard	0.9	0.0%	53
Other	1.0	0.0%	57
<b>Demolition Component</b>	<b>669.0</b>	<b>19.3%</b>	<b>38715</b>
Wood	233.7	6.8%	13526
Drywall	63.3	1.8%	3660
Roofing	275.7	8.0%	15956
Masonry	42.9	1.2%	2482
Metal	3.1	0.1%	181
Carpet	48.1	1.4%	2782
Other	2.2	0.1%	127
<b>Industrial Component</b>	<b>288.2</b>	<b>8.3%</b>	<b>16677</b>
Cardboard	115.1	3.3%	6660
Paper	7.4	0.2%	428
Food	3.8	0.1%	218
Metal	2.8	0.1%	160
Wood	76.9	2.2%	4451
Plastic	17.1	0.5%	992
Textiles	2.9	0.1%	166
Rubber	20.2	0.6%	1170
Other	42.0	1.2%	2432
<b>Other Component</b>	<b>2.0</b>	<b>0.1%</b>	<b>113</b>
Sludge	2.0	0.1%	113
Tree Trunks	0.0	0.0%	0
<b>Special Component</b>	<b>658.3</b>	<b>19.0%</b>	<b>38095</b>
Bulky	41.5	1.2%	2399
Contaminated Soil	600.6	17.4%	34754
Asbestos	16.1	0.5%	932
Tritium	0.0	0.0%	0
E-scrap	0.2	0.0%	10
<b>Total Waste Components</b>	<b>3460.0</b>	<b>100.0%</b>	<b>200218</b>

## **Lemons Sanitary Landfill**

### **Dexter, Missouri**

#### **Introduction**

Allied Waste Industries Inc. owns and operates the Lemons Sanitary Landfill near Dexter, MO. According to DNR tonnage reports the Lemons Landfill received 108,696 tons of waste in 2007.

Waste disposal was observed at the Lemons Landfill between Monday August 11, 2008 and Friday August 15, 2008. Observation took place between 7 AM and 4:00 PM each day for a total of 45 hours. The weather was seasonal with no rain. During the observation period, 223 vehicles unloaded 2,263 tons of waste into the landfill. The breakdown by day is as follows:

#### **Data Collection**

<b>Day</b>	<b># of Vehicles</b>	<b>Weight in Tons</b>
Monday 8/11	45	445.9
Tuesday 8/12	41	438.7
Wednesday 8/13	38	403.8
Thursday 8/14	46	458.3
Friday 8/15	53	516.3
<b>Week's Total</b>	<b>223</b>	<b>2262.9</b>

During the observation week the waste composition was visually assessed and categorized into the following major sectors:

<b>Type of waste</b>	<b>Weight in Tons</b>	<b>Percent of the Total</b>
MSW	1353.2	59.8%
Construction	9.9	0.4%
Demolition	326.9	14.4%
Industrial	492.0	21.7%
Other	16.9	0.7%
Special	64.2	2.8%
<b>Week's Total</b>	<b>2262.9</b>	<b>100%</b>

#### **Municipal Solid Waste (MSW)**

The Municipal Solid Waste (MSW) sector was 60% of the total waste. The MSW was delivered to the landfill primarily by packer trucks and transfer trailers. Transfer trailers came from the Tri County transfer station and the City of Cape Girardeau Transfer Station. The daily breakdown was:

<b>Day</b>	<b>Weight in Tons</b>	<b>Percent of the Total</b>
Monday 8/11	308.5	69%
Tuesday 8/12	284.7	65%
Wednesday 8/13	216.0	53%
Thursday 8/14	256.0	56%
Friday 8/15	288.0	56%
<b>Week's Total</b>	<b>1353.2</b>	<b>59.8%</b>

Construction and Demolition loads were assessed separately instead of combining them into a collective C&D category. The reasoning was that construction waste is cleaner and more easily separated than demolition waste. Therefore if a material recycling program was instituted it would be easier to source separate and reclaim construction waste. Waste was classified as demolition if the materials were attached to each other, pulverized, or unable to be easily separated.

### Construction Waste

The Construction Waste sector was 0.4% of the total waste. The relatively small amount of construction waste was delivered to the landfill in open top roll-off containers or dump trucks by private construction companies. Each construction waste load was visually estimated and allocated into the following components:

Const. Components	Weight in Tons	% of Const. Sector
Wood	5.5	56%
Drywall	0	0%
Masonry	0	0%
Metal	0.7	7%
Plastic	3.7	37%
Cardboard	0	0%
Other	0	0%
<b>Total Construction Sector</b>	<b>9.9</b>	<b>100%</b>

### Demolition Waste

The Demolition Waste sector was 14.4% of the total waste. Demolition waste was delivered to the landfill primarily in open top roll-off containers, dump trucks, dump trailers, and self haul vehicles. The largest components were wood and roofing. Each demolition load was visually estimated and allocated into the following components:

Demolition Components	Weight in Tons	% of Demolition
Wood	100.3	31%
Drywall	42.3	13%
Roofing	115.7	35%
Masonry	33.0	10%
Metal	2.6	1%
Carpet	27.2	8%
Other	5.9	2%
<b>Total Demolition Sector</b>	<b>326.9</b>	<b>100%</b>

### Industrial Waste

The Industrial Waste sector was 21.7% of the total waste. The largest industrial component was smelting byproducts from Noranda Aluminum (216.5 tons). The industrial food components were from Bryers Ice Crème, Tyson Chickens, and spoiled grain. Industrial cardboard was also a significant waste item (84 tons). Each industrial waste load was visually estimated and allocated into the following components:

<b>Industrial Components</b>	<b>Weight in Tons</b>	<b>% of Industrial</b>
Cardboard	84.3	17%
Paper	12.5	3%
Food	112.6	23%
Metal	0	0%
Wood	43.9	9%
Plastic	11.6	2%
Textiles	0	0%
Rubber	10.5	2%
Other	216.5	44%
<b>Total Industrial Sector</b>	<b>492.0</b>	<b>100%</b>

#### **Other Waste**

The 'Other' waste sector was 0.7% of the total waste. The sludge sector was special non hazardous waste sludge from Aramark Uniforms. 'Other' waste loads were visually estimated and allocated into the following components:

<b>Other Components</b>	<b>Weight in Tons</b>	<b>% of Other Waste</b>
Sludge	10.5	62%
Street sweepings and tree trunks	6.4	38%
<b>Total 'Other' Sector</b>	<b>16.9</b>	<b>100%</b>

#### **Special Waste**

The Special Waste sector was 2.8% of the total waste. Special waste was delivered to the landfill primarily in self haul vehicles (bulky and e-waste) and transfer trailers. A bulky item was defined as MSW that was too large for normal trash pick-up and therefore not included in the 2006-2007 MSW waste sorts. There was no contaminated soil or tritium observed. Each special load was visually estimated and allocated into the following components:

<b>Special Components</b>	<b>Weight in Tons</b>	<b>% of Special Waste</b>
Bulky	63.5	99%
Contaminated Soil	0	0%
Asbestos	0	0%
Tritium	0	0%
E-scrap	0.7	1%
<b>Total Special Sector</b>	<b>64.2</b>	<b>100%</b>

#### **Summary**

Table IV-9 represents estimated waste sectors of the Lemons Sanitary Landfill from data collected during the week of August 11-15, 2008. The MSW component percentages were determined during the study conducted in 2006-07. The components for the remainder were visually estimated as waste was received from 8/11-8/15. The percentages for all components were applied to the tonnage received in 2007 to provide estimated annual tonnage for each material.

**Table IV-9: Observed Waste Sectors at the Lemons Landfill**

<b>Waste Component</b>	<b>Estimated Tons 8/11-8/15</b>	<b>Estimated % of Waste 8/11-8/15</b>	<b>Estimated 2007 Tonnage</b>
<b>MSW Component</b>	<b>1353.2</b>	<b>59.8%</b>	<b>64996</b>
MSW paper	272.1	20.1%	21858
MSW Glass	44.0	3.3%	3536
MSW Metal	48.9	3.6%	3926
MSW Plastics	139.6	10.3%	11212
MSW Organics	255.6	18.9%	20532
MSW Inorganics	33.5	2.5%	2691
MSW Special Waste	15.5	1.1%	1241
<b>Construction Component</b>	<b>9.9</b>	<b>0.4%</b>	<b>474</b>
Wood	5.5	0.2%	264
Drywall	0.0	0.0%	0
Masonry	0.0	0.0%	0
Metal	0.7	0.0%	34
Plastic	3.7	0.2%	176
Cardboard	0.0	0.0%	0
Other	0.0	0.0%	0
<b>Demolition Component</b>	<b>326.9</b>	<b>14.4%</b>	<b>15702</b>
Wood	100.3	4.4%	4816
Drywall	42.3	1.9%	2032
Roofing	115.7	5.1%	5558
Masonry	33.0	1.5%	1584
Metal	2.6	0.1%	123
Carpet	27.2	1.2%	1306
Other	5.9	0.3%	284
<b>Industrial Component</b>	<b>492.0</b>	<b>21.7%</b>	<b>23631</b>
Cardboard	84.3	3.7%	4051
Paper	12.5	0.6%	602
Food	112.6	5.0%	5409
Metal	0.0	0.0%	0
Wood	43.9	1.9%	2106
Plastic	11.6	0.5%	556
Textiles	0.0	0.0%	0
Rubber	10.5	0.5%	505
Other	216.5	9.6%	10401
<b>Other Component</b>	<b>16.9</b>	<b>0.7%</b>	<b>810</b>
Sludge	10.5	0.5%	506
Tree Trunks	6.3	0.3%	304
<b>Special Component</b>	<b>64.2</b>	<b>2.8%</b>	<b>3083</b>
Bulky	63.5	2.8%	3051
Contaminated Soil	0.0	0.0%	0
Asbestos	0.0	0.0%	0
Tritium	0.0	0.0%	0
E-scrap	0.7	0.0%	32
<b>Total Waste Components</b>	<b>2262.9</b>	<b>100.0%</b>	<b>108696</b>

## Maple Hill Sanitary Landfill

### Macon County, Missouri

#### Introduction

Veolia Environmental Services owns and operates the Maple Hill sanitary landfill in Macon County, MO. According to DNR tonnage reports the Maple Hill Landfill received 168,386 tons of waste in 2007.

Waste disposal was observed at the Maple Hill Landfill between Monday June 23, 2008 and Thursday June 26, 2008. Observation took place between 7 AM and 5 PM each day for a total of 40 hours. The weather was unusually wet and stormy. The landfill received over 10 inches of rain during the observation period. Observation for Friday 6/27 was suspended due to expected severe storms. During the observation period, 343 vehicles unloaded 3,891 tons of waste into the landfill. The breakdown by day is as follows:

#### Data Collection

Day	# of Vehicles	Weight in Tons
Monday 6/16	87	1066.7
Tuesday 6/17	116	1498.9
Wednesday 6/18	64	646.5
Thursday 6/19	76	678.5
<b>Week's Total</b>	<b>343</b>	<b>3890.6</b>

During the observation week the waste composition was visually assessed and categorized into the following major sectors:

Type of waste	Weight in Tons	Percent of the Total
MSW	2088.3	53.7%
Construction	6.3	0.2%
Demolition	233.9	6.0%
Industrial	185.2	4.7%
Other	10.2	0.3%
Special	1366.7	35.1%
<b>Week's Total</b>	<b>3890.6</b>	<b>100%</b>

#### Municipal Solid Waste (MSW)

The Municipal Solid Waste (MSW) sector was 53.7% of the total waste. The MSW was delivered to the landfill primarily by local packer trucks and transfer trailers. Transfer trailers came from Boonville, Bethany, Moberly, and Chillicothe. The daily breakdown was:

Day	Weight in Tons	Percent of the Total
Monday 6/16	553.8	52%
Tuesday 6/17	546.9	36%
Wednesday 6/18	456.8	71%
Thursday 6/19	530.8	78%
<b>Week's Total</b>	<b>2088.3</b>	<b>53.7%</b>

Construction and Demolition loads were assessed separately instead of combining them into a collective C&D category. The reasoning was that construction waste is cleaner and more easily separated than demolition waste. Therefore if a material recycling program was instituted it would be easier to source separate and reclaim construction waste. Waste was classified as demolition if the materials were attached to each other, pulverized, or unable to be easily separated.

### Construction Waste

The Construction Waste sector was 0.2% of the total waste. This was a much lower percentage than was observed at other sites. The heavy rain during the observation week and the depressed economy may have contributed to the small amount of construction waste. Each construction waste load was visually estimated and allocated into the following components:

Const. Components	Weight in Tons	% of Const. Sector
Wood	3.1	49%
Drywall	0	0%
Masonry	0	0%
Metal	0	0%
Plastic	0.7	11%
Cardboard	2.5	40%
Other	0	0%
<b>Total Construction Sector</b>	<b>6.3</b>	<b>100%</b>

### Demolition Waste

The Demolition Waste sector was 6.0% (233.9 tons) of the total waste. The largest component of the demolition waste stream was wood (62%). Each demolition load was visually estimated and allocated into the following components:

Demolition Components	Weight in Tons	% of Demolition
Wood	146.0	62%
Drywall	16.8	7%
Roofing	43.5	19%
Masonry	2.0	1%
Metal	16.0	7%
Carpet	3.5	1 %
Other	6.1	3%
<b>Total Demolition Sector</b>	<b>233.9</b>	<b>100%</b>

### Industrial Waste

The Industrial Waste sector was 4.7% of the total waste. The food component was from Trenton foods (Vienna sausages), Premium Standard Farms, and bi products from the Con Agra processing plant. The wood component was primarily pallets. The rubber component was shredded tires and tire dust from the electrical power plant. Each industrial waste load was visually estimated and allocated into the following components:



<b>Industrial Components</b>	<b>Weight in Tons</b>	<b>% of Industrial</b>
Cardboard	17.9	10%
Paper	11.4	6%
Food	52.7	29%
Metal	14.6	8%
Wood	39.9	22%
Plastic	7.9	4%
Textiles	0.1	0%
Rubber	26.8	14%
Other	13.9	7%
<b>Total Industrial Sector</b>	<b>185.2</b>	<b>100%</b>

#### **Other Waste**

The 'Other' Waste sector was 0.3% of the total waste. Sludge was received from the Moberly waste treatment plant accounted for most of the weight. Waste loads were visually estimated and allocated into the following components:

<b>Other Components</b>	<b>Weight in Tons</b>	<b>% of Other Waste</b>
Sludge	9.7	95%
Tree trunks	0.5	5%
<b>Total 'Other' Sector</b>	<b>10.2</b>	<b>100%</b>

#### **Special Waste**

The Special Waste sector was 35.1% of the total waste. The largest component was contaminated soil. Fifty one dump truck loads were received from the Ameren UE plant and from a Booneville petroleum clean-up site. This soil will be "aired" and used as daily cover when it is safe. A bulky item was defined as MSW that was too large for normal trash pick-up and therefore not included in the 2006-2007 MSW waste sorts. Each special load was visually estimated and allocated into the following components:

<b>Special Components</b>	<b>Weight in Tons</b>	<b>% of Special Waste</b>
Bulky	12.1	1%
Contaminated Soil	1329.6	97%
Asbestos	24.3	2%
Tritium	0	0%
E-scrap	0.7	0%
<b>Total Special Sector</b>	<b>1366.7</b>	<b>100%</b>

#### **Summary**

Table IV-10 represents estimated waste sectors of the Maple Hill Sanitary Landfill from data collected during the week of June 23-26, 2008. The MSW component percentages were determined during the study conducted in 2006-07. The components for the remainder were visually estimated as waste was received from 6/23-6/26. The percentages for all components were applied to the tonnage received in 2007 to provide estimated annual tonnage for each material.

**Table IV-10: Observed Waste Sectors at the Maple Hill Landfill**

<b>Waste Component</b>	<b>Observed Tons 6/23-6/26</b>	<b>% of Waste Observed 6/23-6/26</b>	<b>Estimated 2007 Tonnage</b>
<b>MSW Component</b>	<b>2088.3</b>	<b>54%</b>	<b>90380</b>
MSW paper	376.9	18.1%	30395
MSW Glass	61.0	2.9%	4917
MSW Metal	67.7	3.2%	5459
MSW Plastics	193.3	9.3%	15591
MSW Organics	354.1	17.0%	28551
MSW Inorganics	46.4	2.2%	3742
MSW Special Waste	21.4	1.0%	1726
			0
<b>Construction Component</b>	<b>6.3</b>	<b>0%</b>	<b>274</b>
Wood	3.1	0%	133
Drywall	0.0	0%	0
Masonry	0.0	0%	0
Metal	0.0	0%	0
Plastic	0.7	0%	29
Cardboard	2.5	0%	110
Other	0.0	0%	1
			0
<b>Demolition Component</b>	<b>233.9</b>	<b>6%</b>	<b>10123</b>
Wood	146.0	4%	6317
Drywall	16.8	0%	727
Roofing	43.5	1%	1881
Masonry	2.0	0%	86
Metal	16.0	0%	692
Carpet	3.5	0%	151
Other	6.2	0%	269
<b>Industrial Component</b>	<b>185.2</b>	<b>5%</b>	<b>8013</b>
Cardboard	17.9	0%	775
Paper	11.4	0%	491
Food	52.7	1%	2282
Metal	14.6	0%	630
Wood	39.9	1%	1725
Plastic	7.9	0%	344
Textiles	0.1	0%	5
Rubber	26.8	1%	1161
Other	13.9	0%	599
<b>Other Component</b>	<b>10.2</b>	<b>0%</b>	<b>443</b>
Sludge	9.8	0%	422
Tree Trunks	0.5	0%	21
<b>Special Component</b>	<b>1366.7</b>	<b>35%</b>	<b>59152</b>
Bulky	12.1	0%	522
Contaminated Soil	1329.6	34%	57547
Asbestos	24.3	1%	1052
Tritium	0.0	0%	0
E-scrap	0.7	0%	32
<b>Total Waste Components</b>	<b>3890.6</b>	<b>100%</b>	<b>168386</b>

## City of Neosho Transfer Station

### Introduction

The Neosho Transfer Station, in Neosho, MO, is owned by the City of Neosho and operated by Waste Corporation of America (WCA). The waste is hauled to the WCA landfill in Arcadia, Kansas, for disposal. According to DNR tonnage reports the Neosho Transfer Station received 18,683 tons of waste in 2007.

Waste disposal was observed at the Neosho Transfer Station between Monday September 29, 2008 and Friday October 3, 2008. The transfer station was observed for the entire time the transfer station was open. During the observation period 95 vehicles unloaded 403 tons of waste into the transfer station. The breakdown by day is as follows:

### Data Collection

Day	# of Vehicles	Weight in Tons
Monday 9/29	16	67.2
Tuesday 9/30	17	62.1
Wednesday 10/3	20	86.2
Thursday 10/2	15	70.3
Friday 10/3	27	117.2
<b>Week's Total</b>	<b>95</b>	<b>403.0</b>

During the observation week the waste composition was visually assessed and categorized into the following major sectors:

Type of waste	Weight in Tons	Percent of the Total
MSW	233.5	58%
Construction	2.4	1%
Demolition	52.7	13%
Industrial	109.3	27%
Other	.5	0%
Special	4.6	1%
<b>Week's Total</b>	<b>403.0</b>	<b>100%</b>

### Municipal Solid Waste (MSW)

The Municipal Solid Waste (MSW) sector was 58% of the total waste. MSW was delivered to the transfer station primarily by packer. The daily breakdown was:

Day	Weight in Tons	Percent of the Total
Monday 9/29	44.4	66%
Tuesday 9/30	44.8	72%
Wednesday 10/3	50.7	59%
Thursday 10/2	40.5	58%
Friday 10/3	53.1	45%
<b>Week's Total</b>	<b>233.5</b>	<b>100%</b>

Construction and Demolition loads were assessed separately instead of combining them into a collective C&D category. The reasoning was that construction waste is cleaner and more easily separated than demolition waste. Therefore if a material recycling program was instituted it would be easier to source separate and reclaim construction waste. Waste was classified as demolition if the materials were attached to each other, pulverized, or unable to be easily separated.

### Construction Waste

The Construction Waste sector was only 0.6% of the total waste. A total of 2.4 tons of construction waste was delivered to the transfer station during the week. Most of this waste (75%) was wood. Each construction waste load was visually estimated and allocated into the following components:

Const. Components	Weight in Tons	% of Const. Sector
Wood	1.8	75%
Drywall	0	0%
Masonry	0	0%
Metal	0	0%
Plastic	0.6	25%
Cardboard	0	0%
Other	0	0%
<b>Total Construction Sector</b>	<b>2.4</b>	<b>100%</b>

### Demolition Waste

The Demolition Waste sector was 13.1% of the total waste. A total of 52.7 tons of demolition waste was delivered to the transfer station during the week. Approximately half of the demolition materials were roofing materials (26.5 tons). Wood accounted for most of the remaining component (16.4 tons). Each demolition load was visually estimated and allocated into the following components:

Demolition Components	Weight in Tons	% of Demolition
Wood	16.4	31%
Drywall	3.1	6%
Roofing	26.5	50%
Masonry	2.1	4%
Metal	2.6	5%
Carpet	2.0	4%
Other	0	0%
<b>Total Demolition Sector</b>	<b>52.7</b>	<b>100%</b>

### Industrial Waste

The Industrial Waste sector was 27.1% of the total waste. A total of 109.3 tons of industrial waste was delivered to the transfer station during the week. The largest industrial component waste was wood pallets (34%). Food waste consisted of cheese from Schreiber Foods and out dated milk products from Milk-Not. Each industrial waste load was visually estimated and allocated into the following components:

<b>Industrial Components</b>	<b>Weight in Tons</b>	<b>% of Industrial</b>
Cardboard	14.4	13%
Paper	4.5	4%
Food	27.3	25%
Metal	0.0	0%
Wood	37.7	34%
Plastic	23.9	22%
Textiles	1.1	1%
Rubber	0.2	0%
Other	0.2	0%
<b>Total Industrial Sector</b>	<b>109.3</b>	<b>100%</b>

#### **Other Waste**

The 'Other' Waste sector was 0.1% of the total waste. A total of 0.5 tons of 'other' waste was delivered to the landfill during the observation period. All of the waste was tree trunks. Waste loads were visually estimated and allocated into the following components:

<b>Other Components</b>	<b>Weight in Tons</b>	<b>% of Other Waste</b>
Sludge	0	0%
Tree trunks	0.5	100%
<b>Total 'Other' Sector</b>	<b>0.5</b>	<b>100%</b>

#### **Special Waste**

The Special Waste sector was 1.2% of the total waste. The largest component was bulky items at 97%. A bulky item was defined as MSW that was too large for normal trash pick-up and therefore not included in the 2006-2007 MSW waste sorts. The E-scrap was computers and monitors. Each special load was visually estimated and allocated into the following components:

<b>Special Components</b>	<b>Weight in Tons</b>	<b>% of Special Waste</b>
Bulky	4.5	97%
Contaminated Soil	0	0%
Asbestos	0	0%
Tritium	0	0%
E-scrap	0.1	3%
<b>Total Special Sector</b>	<b>4.6</b>	<b>100%</b>

#### **Summary**

Table IV-11 represents estimated waste sectors of the Neosho Transfer Station from data collected during the week of September 29-October 3, 2008. The percentages for all components were applied to the tonnage received in 2007 to provide estimated annual tonnage for each material.

**Table IV-11: Observed Waste Sectors at the Neosho Transfer Station**

<b>Waste Component</b>	<b>Observed Tonnage 9/29-10/3</b>	<b>Estimated % of Waste 9/29-10/3</b>	<b>Estimated 2007 Tonnage</b>
<b>MSW Component</b>	<b>233.5</b>	<b>57.9%</b>	<b>10825</b>
MSW paper	78.5	19.5%	3640
MSW Glass	12.7	3.2%	589
MSW Metal	14.1	3.5%	654
MSW Plastics	40.3	10.0%	1867
MSW Organics	73.8	18.3%	3420
MSW Inorganics	9.7	2.4%	448
MSW Special Waste	4.5	1.1%	207
<b>Construction Component</b>	<b>2.4</b>	<b>0.6%</b>	<b>111</b>
Wood	1.8	0.4%	83
Drywall	0.0	0.0%	0
Masonry	0.0	0.0%	0
Metal	0.0	0.0%	0
Plastic	0.6	0.1%	27
Cardboard	0.0	0.0%	0
Other	0.0	0.0%	0
<b>Demolition Component</b>	<b>52.7</b>	<b>13.1%</b>	<b>2441</b>
Wood	16.4	4.1%	760
Drywall	3.1	0.8%	145
Roofing	26.5	6.6%	1229
Masonry	2.1	0.5%	96
Metal	2.6	0.6%	119
Carpet	2.0	0.5%	93
Other	0.0	0.0%	0
<b>Industrial Component</b>	<b>109.3</b>	<b>27.1%</b>	<b>5068</b>
Cardboard	14.4	3.6%	668
Paper	4.5	1.1%	207
Food	27.3	6.8%	1267
Metal	0.0	0.0%	0
Wood	37.6	9.3%	1744
Plastic	23.8	5.9%	1104
Textiles	1.1	0.3%	53
Rubber	0.2	0.1%	10
Other	0.3	0.1%	15
<b>Other Component</b>	<b>0.5</b>	<b>0.1%</b>	<b>22</b>
Sludge	0.0	0.0%	0
Tree Trunks	0.5	0.1%	22
<b>Special Component</b>	<b>4.6</b>	<b>1.2%</b>	<b>216</b>
Bulky	4.5	1.1%	210
Contaminated Soil	0.0	0.0%	0
Asbestos	0.0	0.0%	0
Tritium	0.0	0.0%	0
E-scrap	0.1	0.0%	6
<b>Total Waste Components</b>	<b>403.0</b>	<b>100.0%</b>	<b>18683</b>

## **Pink Hill Acres Demolition Landfill**

### **Kansas City Metropolitan Area**

#### **Introduction**

Matthew J. Bowen owns and operates the Pink Hill Acres Demolition Landfill in the Kansas City Missouri metropolitan area. According to DNR tonnage reports the Pink Hill Acres Demolition Landfill received 34,659 tons of waste in 2007.

Waste disposal was observed at the Pink Hill Acres Demolition Landfill between Monday October 6, 2008 and Friday October 10, 2008. Observation took place between 7 AM and 5 PM each day for a total of 50 hours. The weather was seasonably mild with no appreciable rain. During the observation period, 129 vehicles unloaded 706.2 tons of waste into the landfill. The breakdown by day is as follows:

#### **Data Collection**

<b>Day</b>	<b># of Vehicles</b>	<b>Weight in Tons</b>
Monday 10/6	29	138.9
Tuesday 10/7	19	177.9
Wednesday 10/8	23	106.1
Thursday 10/9	28	161.7
Friday 10/10	30	121.6
<b>Week's Total</b>	<b>129</b>	<b>706.2</b>

During the observation week the waste composition was visually assessed and categorized into the following major sectors:

<b>Type of waste</b>	<b>Weight in Tons</b>	<b>Percent of the Total</b>
MSW	0	0%
Construction	35.5	5.1%
Demolition	662.5	93.8%
Industrial	6.2	0.9%
Other	1.0	0.1%
Special	1.0	0.1%
<b>Week's Total</b>	<b>706.2</b>	<b>100%</b>

#### **Municipal Solid Waste (MSW)**

The Pink Hill Acres Demolition Landfill is not permitted to receive Municipal Solid Waste (MSW) and none was observed.

The Pink Hill Acres Demolition Landfill recycles a large portion of the materials it receives. Since these materials are not land filled, they are not reported as tonnage received. The recycled materials were not included in the observation. Only the materials actually deposited into the landfill are included below.

Construction and Demolition loads were assessed separately instead of combining them into a collective C&D category. The reasoning was that construction waste is cleaner and more easily separated than demolition waste. Therefore if a material recycling program was instituted it would be easier to source separate and reclaim construction waste. Waste was classified as demolition if the materials were attached to each other, pulverized, or unable to be easily separated.

### Construction Waste

The Construction Waste sector was 5.0% of the total waste. Most of the construction waste was wood (28.4 tons). Masonry consisted of inert materials (sand, dirt, brick, concrete etc.) The 'other' component consisted of insulation, paint, windows, etc. Each construction waste load was visually estimated and allocated into the following components:

Const. Components	Weight in Tons	% of Const. Sector
Wood	28.4	80%
Drywall	0.3	1%
Masonry	0	0%
Metal	0	0%
Plastic	2.2	6%
Cardboard	4.6	13%
Other	0	0%
<b>Total Construction Sector</b>	<b>35.5</b>	<b>100%</b>

### Demolition Waste

The Demolition Waste sector was 93.8% of the total waste. Wood waste (258.6 tons) and roofing shingles (265.5 tons) accounted for most of the demolition wastes. Each demolition load was visually estimated and allocated into the following components:

Demolition Components	Weight in Tons	% of Demolition
Wood	258.5	39%
Drywall	13.1	2%
Roofing	265.5	40%
Masonry	116.5	18%
Metal	1.1	0%
Carpet	7.7	1%
Other	0.1	0%
<b>Total Demolition Sector</b>	<b>662.5</b>	<b>100%</b>

### Industrial Waste

The Industrial Waste sector was 0.9% (6.2 tons) of the total waste. The largest percentage of industrial waste was wood (5.9 tons) and consisted mostly of wooden pallets. Pink Hill recycled quite a bit of the wood and all of the cardboard before it reached the landfill area. Each industrial waste load was visually estimated and allocated into the following components:



<b>Industrial Components</b>	<b>Weight in Tons</b>	<b>% of Industrial</b>
Cardboard	0	0%
Paper	0.3	5%
Food	0	0%
Metal	0	0%
Wood	5.9	95%
Plastic	0	0%
Textiles	0	0%
Rubber	0	0%
Other	0	0%
<b>Total Industrial Sector</b>	<b>6.2</b>	<b>100%</b>

#### **Other Waste**

The 'Other' Waste sector was 0.1% (1.0 tons) of the total waste. The entire amount consisted of one small load of large tree limbs and tree trunks. 'Other' waste loads were visually estimated and allocated into the following components:

<b>Other Components</b>	<b>Weight in Tons</b>	<b>% of Other Waste</b>
Sludge	0	0%
Street sweepings and tree trunks	1.0	100%
<b>Total 'Other' Sector</b>	<b>1.0</b>	<b>100%</b>

#### **Special Waste**

The Special Waste sector was 0.1% (0.9 tons) of the total waste. The entire special waste sector was bulky items. Each special load was visually estimated and allocated into the following components:

<b>Special Components</b>	<b>Weight in Tons</b>	<b>% of Special Waste</b>
Bulky	1.0	100%
Contaminated Soil	0	0%
Asbestos	0	0%
Tritium	0	0%
E-scrap	0	0%
<b>Total Special Sector</b>	<b>1.0</b>	<b>100%</b>

#### **Summary**

Table IV-12 represents estimated waste sectors of the Pink Hill Acres Demolition landfill from data collected during the week of October 6 through October 10, 2008. There was no MSW observed at the landfill. The components for the remainder were visually estimated as waste was received from 10/6-10/10. The percentages for all components were applied to the tonnage received in 2007 to provide estimated annual tonnage for each material.

**Table IV-12: Observed Waste Sectors at the Pink Hill Acres Demolition Landfill**

<b>Waste Component</b>	<b>Observed Tonnage 10/6-10/10</b>	<b>Estimated % of Waste 10/6-10/10</b>	<b>Estimated 2007 Tonnage</b>
<b>MSW Component</b>	<b>0</b>	<b>0.0%</b>	<b>0</b>
MSW paper	0	0.0%	0
MSW Glass	0	0.0%	0
MSW Metal	0	0.0%	0
MSW Plastics	0	0.0%	0
MSW Organics	0	0.0%	0
MSW Inorganics	0	0.0%	0
MSW Special Waste	0	0.0%	0
<b>Construction Component</b>	<b>35.5</b>	<b>5.0%</b>	<b>1744</b>
Wood	28.4	4.0%	1395
Drywall	0.3	0.0%	15
Masonry	0.0	0.0%	0
Metal	0.0	0.0%	0
Plastic	2.2	0.3%	106
Cardboard	4.6	0.7%	228
Other	0.0	0.0%	0
<b>Demolition Component</b>	<b>662.5</b>	<b>93.8%</b>	<b>32516</b>
Wood	258.6	36.6%	12691
Drywall	13.1	1.8%	641
Roofing	265.5	37.6%	13030
Masonry	116.5	16.5%	5719
Metal	1.1	0.2%	52
Carpet	7.7	1.1%	378
Other	0.1	0.0%	6
<b>Industrial Component</b>	<b>6.2</b>	<b>0.9%</b>	<b>304</b>
Cardboard	0.0	0.0%	0
Paper	0.3	0.0%	14
Food	0.0	0.0%	0
Metal	0.0	0.0%	0
Wood	5.9	0.8%	290
Plastic	0.0	0.0%	0
Textiles	0.0	0.0%	0
Rubber	0.0	0.0%	0
Other	0.0	0.0%	0
<b>Other Component</b>	<b>1.0</b>	<b>0.1%</b>	<b>48</b>
Sludge	0.0	0.0%	0
Tree Trunks	1.0	0.1%	48
<b>Special Component</b>	<b>1.0</b>	<b>0.1%</b>	<b>47</b>
Bulky	1.0	0.1%	47
Contaminated Soil	0.0	0.0%	0
Asbestos	0.0	0.0%	0
Tritium	0.0	0.0%	0
E-scrap	0.0	0.0%	0
<b>Total Waste Components</b>	<b>706.2</b>	<b>100.0%</b>	<b>34659</b>

# Prairie View Sanitary Landfill

Lamar, Missouri

## Introduction

Allied Waste Industries Inc. owns and operates the Prairie View Sanitary Landfill near Lamar, MO. According to DNR tonnage reports the Prairie View Landfill received 581,253 tons of waste in 2007.

Waste disposal was observed at the Prairie View Landfill between Monday September 15, 2008 and Friday September 19, 2008. Observation took place between 7 AM and 4:00 PM each day for a total of 45 hours. The weather was seasonal with no rain. During the observation period, 345 vehicles unloaded 7,887.3 tons of waste into the landfill. The breakdown by day is as follows:

## Data Collection

Day	# of Vehicles	Weight in Tons
Monday 9/15	77	2021.6
Tuesday 9/16	68	1589.4
Wednesday 9/17	75	1741.6
Thursday 9/18	74	1471.6
Friday 9/19	51	1063.1
<b>Week's Total</b>	<b>345</b>	<b>7887.3</b>

During the observation week the waste composition was visually assessed and categorized into the following major sectors:

Type of waste	Weight in Tons	Percent of the Total
MSW	5459.3	69.2%
Construction	57.2	0.7%
Demolition	950.2	12.1%
Industrial	1020.9	12.9%
Other	159.7	2.0%
Special	240.0	3.1%
<b>Week's Total</b>	<b>7887.3</b>	<b>100%</b>

## Municipal Solid Waste (MSW)

The Municipal Solid Waste (MSW) sector was 69% of the total waste. The MSW was delivered to the landfill primarily by packer trucks and transfer trailers. Transfer trailers came from Springfield, MO., Reeds Spring, MO., Galena, KS, and Bella Vista, AR. The daily breakdown was:

Day	Weight in Tons	Percent of the Total
Monday 9/15	1472.0	73%
Tuesday 9/16	1166.3	74%
Wednesday 9/17	1134.0	65%
Thursday 9/18	1017.5	69%
Friday 9/19	669.5	63%
<b>Week's Total</b>	<b>5459.3</b>	<b>69.2%</b>

Construction and Demolition loads were assessed separately instead of combining them into a collective C&D category. The reasoning was that construction waste is cleaner and more easily separated than demolition waste. Therefore if a material recycling program was instituted it would be easier to source separate and reclaim construction waste. Waste was classified as demolition if the materials were attached to each other, pulverized, or unable to be easily separated.

### Construction Waste

The Construction Waste sector was 0.7% of the total waste. The largest component was plastic (vinyl) siding. Each construction waste load was visually estimated and allocated into the following components:

Const. Component	Weight in Tons	% of Const. Sector
Wood	17.3	30%
Drywall	10.7	19%
Masonry	0.6	1%
Metal	4.7	8%
Plastic	22.0	38%
Cardboard	1.0	2%
Other	0.9	2%
<b>Total Construction Sector</b>	<b>57.2</b>	<b>100%</b>

### Demolition Waste

The Demolition Waste sector was 12% of the total waste. The largest component was wood (68%). Each demolition load was visually estimated and allocated into the following components:

Demolition Components	Weight in Tons	% of Demolition
Wood	643.0	68%
Drywall	82.5	9%
Roofing	104.8	11%
Masonry	21.2	2%
Metal	19.2	2%
Carpet	76.4	8%
Other	3.1	0%
<b>Total Demolition Sector</b>	<b>950.2</b>	<b>100%</b>

### Industrial Waste

The Industrial Waste sector was 12.9% of the total waste. The largest industrial component was the 'other' category. Most of that material was auto fluff from Springfield Iron and Metal Co. (528.4 tons). The industrial food components were milk, cheese, and turkey feathers. Industrial cardboard was also a significant waste item (122 tons). Each industrial waste load was visually estimated and allocated into the following components:

Industrial Components	Weight in Tons	% of Industrial
Cardboard	121.8	12%
Paper	9.8	1%

Food	209.4	21%
Metal	5.9	1%
Wood	87.7	9%
Plastic	50.8	5%
Textiles	4.2	0%
Rubber	2.9	0%
Other	528.4	51%
<b>Total Industrial Sector</b>	<b>1020.9</b>	<b>100%</b>

#### Other Waste

The 'Other' waste sector was 2% of the total waste. The sludge component consisted of human and hog waste. The 'Other' waste loads were visually estimated and allocated into the following components:

Other Components	Weight in Tons	% of Other Waste
Sludge	156.7	98%
Street sweepings and tree trunks	3.0	2%
<b>Total 'Other' Sector</b>	<b>159.7</b>	<b>100%</b>

#### Special Waste

The Special Waste sector was 3% of the total waste. Contaminated soil primarily came from a railroad renovation project. The asbestos was non-friable. A bulky item was defined as MSW that was too large for normal trash pick-up and therefore not included in the 2006-2007 MSW waste sorts. Each special load was visually estimated and allocated into the following components:

Special Components	Weight in Tons	% of Special Waste
Bulky	93.8	39%
Contaminated Soil	117.5	49%
Asbestos	28.6	12%
Tritium	0	0%
E-scrap	0.1	0%
<b>Total Special Sector</b>	<b>240.0</b>	<b>100%</b>

#### Summary

Table IV-13 represents estimated waste sectors of the Prairie View Sanitary Landfill from data collected during the week of September 15-19, 2008. The MSW component percentages were determined during the study conducted in 2006-07. The components for the remainder were visually estimated as waste was received from 9/15-9/19. The percentages for all components were applied to the tonnage received in 2007 to provide estimated annual tonnage for each material.

**Table IV-13: Observed Waste Sectors at the Prairie View Landfill**

<b>Waste Component</b>	<b>Observed Tonnage 9/15-9/19</b>	<b>Estimated % of Waste 9/15-9/19</b>	<b>Estimated 2007 Tonnage</b>
<b>MSW Component</b>	<b>5459.3</b>	<b>69.2%</b>	<b>402325</b>
MSW paper	1270.8	23.3%	135302
MSW Glass	205.6	3.8%	21886
MSW Metal	228.2	4.2%	24300
MSW Plastics	651.8	11.9%	69401
MSW Organics	1193.7	21.9%	127095
MSW Inorganics	156.4	2.9%	16656
MSW Special Waste	72.2	1.3%	7684
<b>Construction Component</b>	<b>57.2</b>	<b>0.7%</b>	<b>4217</b>
Wood	17.3	0.2%	1273
Drywall	10.7	0.1%	786
Masonry	0.6	0.0%	44
Metal	4.7	0.1%	347
Plastic	22.1	0.3%	1627
Cardboard	1.0	0.0%	71
Other	0.9	0.0%	68
<b>Demolition Component</b>	<b>950.2</b>	<b>12.0%</b>	<b>70020</b>
Wood	643.0	8.2%	47383
Drywall	82.5	1.0%	6076
Roofing	104.8	1.3%	7722
Masonry	21.2	0.3%	1564
Metal	19.2	0.2%	1415
Carpet	76.4	1.0%	5630
Other	3.1	0.0%	229
<b>Industrial Component</b>	<b>1020.9</b>	<b>12.9%</b>	<b>75238</b>
Cardboard	121.9	1.5%	8987
Paper	9.8	0.1%	722
Food	209.4	2.7%	15432
Metal	5.9	0.1%	438
Wood	87.7	1.1%	6460
Plastic	50.8	0.6%	3741
Textiles	4.2	0.1%	306
Rubber	2.9	0.0%	210
Other	528.4	6.7%	38941
<b>Other Component</b>	<b>159.7</b>	<b>2.0%</b>	<b>11770</b>
Sludge	156.7	2.0%	11548
Tree Trunks	3.0	0.0%	222
<b>Special Component</b>	<b>240.0</b>	<b>3.0%</b>	<b>17683</b>
Bulky	93.8	1.2%	6914
Contaminated Soil	117.5	1.5%	8657
Asbestos	28.6	0.4%	2108
Tritium	0.0	0.0%	0
E-scrap	0.1	0.0%	4
<b>Total Waste Components</b>	<b>7887.3</b>	<b>100.0%</b>	<b>581253</b>

## Show-Me Sanitary Landfill

Warrensburg, Missouri

### Introduction

Allied Waste Industries Inc. owns and operates the Show-Me sanitary landfill near Warrensburg, MO. According to DNR tonnage reports the Show-Me Landfill received 173,894 tons of waste in 2007.

Waste disposal was observed at the Show-Me Landfill between Monday June 9, 2008 and Friday June 13, 2008. Observation took place between 7 AM and 4:30 PM each day for a total of 47 hours. The weather was unseasonably cool, wet, and windy. During the observation period, 345 vehicles unloaded 4,053 tons of waste into the landfill. The breakdown by day is as follows:

### Data Collection

Day	# of Vehicles	Weight in Tons
Monday 6/9	61	757.5
Tuesday 6/10	70	736.9
Wednesday 6/11	83	852.2
Thursday 6/12	61	839.2
Friday 6/13	70	867.4
<b>Week's Total</b>	<b>345</b>	<b>4053.2</b>

During the observation week the waste composition was visually assessed and categorized into the following major sectors:

Type of waste	Weight in Tons	Percent of the Total
MSW	3260.4	80.4%
Construction	12.4	0.3%
Demolition	162.5	4.0%
Industrial	448.9	11.1%
Other	146.0	3.6%
Special	23.0	0.6%
<b>Week's Total</b>	<b>4053.2</b>	<b>100%</b>

### Municipal Solid Waste (MSW)

The Municipal Solid Waste (MSW) sector was 80% of the total waste. The MSW was delivered to the landfill primarily by packer trucks. Transfer trailers came from the Town and Country transfer station in Harrisonville. The daily breakdown was:

Day	Weight in Tons	Percent of the Total
Monday 6/9	642.7	85%
Tuesday 6/10	615.1	83%
Wednesday 6/11	623.5	73%
Thursday 6/12	675.4	80%
Friday 6/13	703.7	81%
<b>Week's Total</b>	<b>3260.4</b>	<b>80%</b>

Construction and Demolition loads were assessed separately instead of combining them into a collective C&D category. The reasoning was that construction waste is cleaner and more easily separated than demolition waste. Therefore if a material recycling program was instituted it would be easier to source separate and reclaim construction waste. Waste was classified as demolition if the materials were attached to each other, pulverized, or unable to be easily separated.

### Construction Waste

The Construction Waste sector was 0.3% of the total waste. This was a much lower percentage than was observed at other sites. The relatively small amount of construction waste was delivered to the landfill by private construction companies. Each construction waste load was visually estimated and allocated into the following components:

Const. Component	Weight in Tons	% of Const. Sector
Wood	4.3	34%
Drywall	3.3	27%
Masonry	0.6	5%
Metal	0.5	4%
Plastic	1.6	13%
Cardboard	1.1	9%
Other	1.0	8%
<b>Total Construction Sector</b>	<b>12.4</b>	<b>100%</b>

### Demolition Waste

The Demolition Waste sector was 4.0% of the total waste. Demolition waste was delivered to the landfill primarily in open top roll-off containers, dump trucks, dump trailers, and self haul vehicles. Each demolition load was visually estimated and allocated into the following components:

Demolition Components	Weight in Tons	% of Demolition
Wood	51.2	32%
Drywall	11.3	7%
Roofing	52.3	32%
Masonry	11.8	7%
Metal	5.0	3%
Carpet	13.6	8%
Other	17.3	11%
<b>Total Demolition Sector</b>	<b>162.5</b>	<b>100%</b>

### Industrial Waste

The Industrial Waste sector was 11.1% of the total waste. The percentage of industrial food waste was especially high due to several loads of chicken parts from the local Tyson Chicken processing plant. The chicken parts were delivered to the landfill in special 40' trailers. Other industrial waste was delivered to the landfill in roll-off containers. Each industrial waste load was visually estimated and allocated into the following components:



<b>Industrial Components</b>	<b>Weight in Tons</b>	<b>% of Industrial</b>
Cardboard	88.9	20%
Paper	1.5	0%
Food	226.3	50%
Metal	2.0	1%
Wood	51.8	12%
Plastic	48.6	11%
Textiles	0	0%
Rubber	5.8	1%
Other	24.0	5%
<b>Total Industrial Sector</b>	<b>448.9</b>	<b>100%</b>

#### **Other Waste**

The 'Other' Waste sector was 3.6% of the total waste. The sludge sector was dewatered chicken sludge. A large amount of tree trunks were disposed during the observation period. 'Other' waste loads were visually estimated and allocated into the following components:

<b>Other Components</b>	<b>Weight in Tons</b>	<b>% of Other Waste</b>
Sludge	27	18%
Street sweepings and tree trunks	119	82%
<b>Total 'Other' Sector</b>	<b>146</b>	<b>100%</b>

#### **Special Waste**

The Special Waste sector was 0.6% of the total waste. Special waste was delivered to the landfill primarily in closed trucks (asbestos) and self haul vehicles (bulky and e-waste). A bulky item was defined as MSW that was too large for normal trash pick-up and therefore not included in the 2006-2007 MSW waste sorts. There was no contaminated soil or tritium observed. Each special load was visually estimated and allocated into the following components:

<b>Special Components</b>	<b>Weight in Tons</b>	<b>% of Special Waste</b>
Bulky	18.2	79%
Contaminated Soil	0	0%
Asbestos	4.0	18%
Tritium	0	0%
E-scrap	0.8	3%
<b>Total Special Sector</b>	<b>23.0</b>	<b>100%</b>

#### **Summary**

Table IV-14 represents estimated waste sectors of the Show-Me Sanitary Landfill from data collected during the week of June 9-13, 2008. The MSW component percentages were determined during the study conducted in 2006-07. The components for the remainder were visually estimated as waste was received from 6/9-6/13. The percentages for all components were applied to the tonnage received in 2007 to provide estimated annual tonnage for each material.

**Table IV-14: Observed Waste Sectors at the Show-Me Landfill**

<b>Waste Component</b>	<b>Observed Tonnage 6/9-6/13</b>	<b>Estimated % of Waste 6/9-6/13</b>	<b>Estimated 2007 Tonnage</b>
<b>MSW Component</b>	<b>3260.4</b>	<b>80.4%</b>	<b>139882</b>
MSW paper	882.0	27.1%	47042
MSW Glass	142.7	4.4%	7610
MSW Metal	158.4	4.9%	8449
MSW Plastics	452.4	13.9%	24130
MSW Organics	828.5	25.4%	44189
MSW Inorganics	108.6	3.3%	5791
MSW Special Waste	50.1	1.5%	2672
			0
<b>Construction Component</b>	<b>12.4</b>	<b>0.3%</b>	<b>533</b>
Wood	4.3	0.1%	183
Drywall	3.3	0.1%	142
Masonry	0.6	0.0%	25
Metal	0.5	0.0%	22
Plastic	1.6	0.0%	67
Cardboard	1.1	0.0%	49
Other	1.0	0.0%	44
<b>Demolition Component</b>	<b>162.5</b>	<b>4.0%</b>	<b>6970</b>
Wood	51.2	1.3%	2197
Drywall	11.3	0.3%	483
Roofing	52.3	1.3%	2243
Masonry	11.8	0.3%	505
Metal	5.0	0.1%	214
Carpet	13.6	0.3%	585
Other	17.3	0.4%	742
<b>Industrial Component</b>	<b>448.9</b>	<b>11.1%</b>	<b>19259</b>
Cardboard	88.9	2.2%	3812
Paper	1.5	0.0%	65
Food	226.3	5.6%	9708
Metal	2.0	0.1%	87
Wood	51.8	1.3%	2223
Plastic	48.6	1.2%	2085
Textiles	0.0	0.0%	0
Rubber	5.8	0.1%	248
Other	24.0	0.6%	1030
<b>Other Component</b>	<b>145.9</b>	<b>3.6%</b>	<b>6261</b>
Sludge	27.0	0.7%	1157
Tree Trunks	119.0	2.9%	5104
<b>Special Component</b>	<b>23.0</b>	<b>0.6%</b>	<b>989</b>
Bulky	18.3	0.5%	784
Contaminated Soil	0.0	0.0%	0
Asbestos	4.0	0.1%	172
Tritium	0.0	0.0%	0
E-scrap	0.8	0.0%	33
<b>Total Waste Components</b>	<b>4053.2</b>	<b>100.0%</b>	<b>173894</b>

## St. Louis North Metro Transfer Station

### Introduction

Waste Management Industries (WMI) operates the St. Louis Solid Waste Processing Facility in St. Louis, MO. The waste is disposed in the WMI landfill in Illinois. According to DNR tonnage reports the North Metro Transfer Station received 202,891 tons of waste in 2007.

Waste disposal was observed at the St. Louis Solid Waste Processing Facility between Monday August 4, 2008 and Friday August 8, 2008. The transfer station was observed for ten hours each day. The hours varied from 5 AM to 5 PM in order to get a good, representative sample of the waste. During the observation period 780 vehicles unloaded 3,164.1 tons of waste into the transfer station. The breakdown by day is as follows:

### Data Collection

Day	# of Vehicles	Weight in Tons
Monday 8/4	164	774.2
Tuesday 8/5	150	604.2
Wednesday 8/6	92	284.5
Thursday 8/7	189	746.6
Friday 8/8	185	754.6
<b>Week's Total</b>	<b>780</b>	<b>3164.1</b>

During the observation week the waste composition was visually assessed and categorized into the following major sectors:

Type of waste	Weight in Tons	Percent of the Total
MSW	2058.8	65.1%
Construction	53.4	1.7%
Demolition	260.7	8.2%
Industrial	153.6	4.9%
Other	402.7	12.7%
Special	234.9	7.4%
<b>Week's Total</b>	<b>3164.1</b>	<b>100%</b>

### Municipal Solid Waste (MSW)

The Municipal Solid Waste (MSW) sector was 65.1% of the total waste. MSW was delivered to the transfer station primarily by packer trucks operated by the City of St. Louis and WMI. The daily breakdown was:

Day	Weight in Tons	Percent of the Total
Monday 8/4	583.3	75%
Tuesday 8/5	420.3	70%
Wednesday 8/6	147.9	52%
Thursday 8/7	490.5	66%
Friday 8/8	416.8	55%
<b>Week's Total</b>	<b>2058.8</b>	<b>65.1%</b>



Construction and Demolition loads were assessed separately instead of combining them into a collective C&D category. The reasoning was that construction waste is cleaner and more easily separated than demolition waste. Therefore if a material recycling program was instituted it would be easier to source separate and reclaim construction waste. Waste was classified as demolition if the materials were attached to each other, pulverized, or unable to be easily separated.

### Construction Waste

The Construction Waste sector was only 1.7% of the total waste. A total of 53.4 tons of construction waste was delivered to the transfer station during the week. Most of this waste (82%) was wood. Each construction waste load was visually estimated and allocated into the following components:

Const. Component	Weight in Tons	% of Const. Sector
Wood	43.9	82%
Drywall	4.4	8%
Masonry	0	0%
Metal	0	0%
Plastic	2.6	5%
Cardboard	1.5	3%
Other	1.0	2%
<b>Total Construction Sector</b>	<b>53.4</b>	<b>100%</b>

### Demolition Waste

The Demolition Waste sector was 8.2% of the total waste. A total of 260.8 tons of demolition waste was delivered to the transfer station during the week. The largest component was wood at 47% of the total demolition waste sector. Each demolition load was visually estimated and allocated into the following components:

Demolition Components	Weight in Tons	% of Demolition
Wood	122.6	47%
Drywall	28.3	11%
Roofing	44.5	17%
Masonry	42.2	16%
Metal	3.0	1%
Carpet	19.7	8%
Other	0.4	0%
<b>Total Demolition Sector</b>	<b>260.7</b>	<b>100%</b>

### Industrial Waste

The Industrial Waste sector was 4.9% of the total waste. A total of 153.5 tons of industrial waste was delivered to the transfer station during the week. The largest industrial component waste was cardboard (45%) and wood pallets (21%). Each industrial waste load was visually estimated and allocated into the following components:

<b>Industrial Components</b>	<b>Weight in Tons</b>	<b>% of Industrial</b>
Cardboard	69.5	45%
Paper	19.6	13%
Food	5.2	3%
Metal	0.2	0%
Wood	31.6	21%
Plastic	16.2	11%
Textiles	0.3	0%
Rubber	0	0%
Other	11.0	7%
<b>Total Industrial Sector</b>	<b>153.6</b>	<b>100%</b>

#### **Other Waste**

The 'Other' Waste sector was 12.7% of the total waste. A total of 402.7 tons of 'other' waste was delivered to the landfill during the observation period. All of the waste was tree trunks. Waste loads were visually estimated and allocated into the following components:

<b>Other Components</b>	<b>Weight in Tons</b>	<b>% of Other Waste</b>
Sludge	0	0%
Tree trunks	402.7	100%
<b>Total 'Other' Sector</b>	<b>402.7</b>	<b>100%</b>

#### **Special Waste**

The Special Waste sector was 7.4% of the total waste. The largest component was bulky items at 92%. A bulky item was defined as MSW that was too large for normal trash pick-up and therefore not included in the 2006-2007 MSW waste sorts. The contaminated soil component was contaminated river mud. Each special load was visually estimated and allocated into the following components:

<b>Special Components</b>	<b>Weight in Tons</b>	<b>% of Special Waste</b>
Bulky	216.9	92%
Contaminated Soil	15.4	7%
Asbestos	0	0%
Tritium	0	0%
E-scrap	2.6	1%
<b>Total Special Sector</b>	<b>234.9</b>	<b>100%</b>

#### **Summary**

Table IV-15 represents estimated waste sectors of the North Metro Transfer Station in St. Louis from data collected during the week of August 4-8, 2008. The percentages for all components were applied to the tonnage received in 2007 to provide estimated annual tonnage for each material.

**Table IV-15: Observed Waste Sectors at the St. Louis Metro North Transfer Station**

<b>Waste Component</b>	<b>Observed Tonnage 8/4-8/8</b>	<b>Estimated % of Waste 8/4-8/8</b>	<b>Estimated 2007 Tonnage</b>
<b>MSW Component</b>	<b>2058.8</b>	<b>65.1%</b>	<b>132018</b>
MSW paper	450.5	21.9%	44398
MSW Glass	72.9	3.5%	7182
MSW Metal	80.9	3.9%	7974
MSW Plastics	231.1	11.2%	22773
MSW Organics	423.2	20.6%	41705
MSW Inorganics	55.5	2.7%	5466
MSW Special Waste	25.6	1.2%	2522
<b>Construction Component</b>	<b>53.4</b>	<b>1.7%</b>	<b>3423</b>
Wood	43.9	1.4%	2814
Drywall	4.4	0.1%	283
Masonry	0.0	0.0%	0
Metal	0.0	0.0%	0
Plastic	2.6	0.1%	168
Cardboard	1.5	0.0%	96
Other	1.0	0.0%	62
<b>Demolition Component</b>	<b>260.7</b>	<b>8.2%</b>	<b>16721</b>
Wood	122.6	3.9%	7863
Drywall	28.3	0.9%	1818
Roofing	44.5	1.4%	2852
Masonry	42.2	1.3%	2708
Metal	3.0	0.1%	194
Carpet	19.7	0.6%	1260
Other	0.4	0.0%	26
<b>Industrial Component</b>	<b>153.6</b>	<b>4.9%</b>	<b>9846</b>
Cardboard	69.5	2.2%	4457
Paper	19.6	0.6%	1257
Food	5.2	0.2%	333
Metal	0.2	0.0%	13
Wood	31.6	1.0%	2024
Plastic	16.2	0.5%	1036
Textiles	0.3	0.0%	22
Rubber	0.0	0.0%	0
Other	11.0	0.3%	705
<b>Other Component</b>	<b>402.7</b>	<b>12.7%</b>	<b>25822</b>
Sludge	0.0	0.0%	0
Tree Trunks	402.7	12.7%	25822
<b>Special Component</b>	<b>234.9</b>	<b>7.4%</b>	<b>15060</b>
Bulky	216.9	6.9%	13906
Contaminated Soil	15.4	0.5%	986
Asbestos	0.0	0.0%	0
Tritium	0.0	0.0%	0
E-scrap	2.6	0.1%	168
<b>Total Waste Components</b>	<b>3164.1</b>	<b>100.0%</b>	<b>202891</b>